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ABC

Submitting articles
Commodore Horizons welcomes readers' contributions — either articles or program listings. Articles should be typed double-spaced with a wide margin. Programs should, whenever possible, be printed out on plain white paper, accompanied by a cassette. We cannot guarantee to return every article or program submitted, so please keep a copy. If you want to have your program returned you must include an s.a.e.

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CONTENTS

Letters 7
More hints, tips and queries, plus Computer Fink's assault on the games market

News 8
Ariola's software plans, Codewriter's catalogue and the latest on CBM US

Soft Hits 11

Mastertronic, Taskset, US Gold, English Software, Bubble Bus — all the new games are here

The Modem Link 21
Brian Lloyd compares the most popular modems and explains what they achieve

Star Game 20
David Whittaker's Lazy Jones rides again in this type-in 64 game

Data sorting 25
N Gregory explains methods of sorting data on the Commodore 64

Tower of Adventure 33
Barbara Conway once more ventures into lands of mystery and magic

MIDI Music 35
Chris Whitcombe looks at Rosetti's music software for the 64

MUD larks 37
Richard Bartle introduces Compunet's multi-user dungeon adventure

Software file 39
Readers' own programs including Vic 20 games and utilities

C16-Plus/4 Companion 43
An extract from Brian Lloyd's book introducing the new Commodore micros

Imprint 46
Our latest look at the world of computer books

Llamasoft contest 48

It's wild, it's whacky, it's Psychedelia, and there are 64, Vic and C16 versions to win

Classified 54
The place to look for bargain software and hardware

Answer Back 56
Jack Cohen's latest look at your programming problems

Slomo contest 58
If you can't keep up with your 64, win a Slomo and cut its pace

EDITORIAL

COMPUNET, MICRONET, AND the many bulletin board systems now available to Commodore micro owners, are at the forefront of modern communications technology. History shows, though, that society is slow to respond to scientific developments. It wasn't long ago that the sight of a motor car would be invariably accompanied by that of a man walking in front with a red warning flag.

It took mass production and the development of the market for the motor car to become a success. In much the same way, an increase in the sheer numbers of network users will force relevant legislation and technical development to be carried through.

At the moment, for instance, the high telephone charges involved in networking discourage many potential users. If special rates could be negotiated then the market would be much wider. At the same time, there are technical problems with the systems which do little to encourage users; Compunet's downloading rates are slow, and it appears that the memory space taken up by the modem itself may limit the use of serious applications software. This might imply that the small business user market, which should form a substantial part of Compunet's subscriptions list, would be limited.

At the same time there are legal questions to be settled; is a network system responsible for all material uploaded, or, as Compunet maintains, is it no more responsible than British Telecom is for what is said over its phone lines? Whether or not networks can be regarded as "electronic publishers", legally responsible for whatever material they carry, will have to be decided before long. It's just one of the ways in which society has not yet adjusted to the micro age, though one thing is sure; once the adjustment is made, the potential of networking is unlimited.

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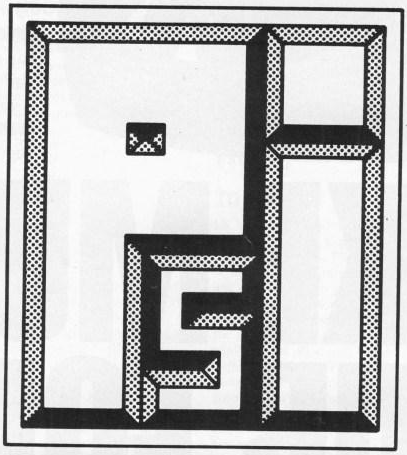

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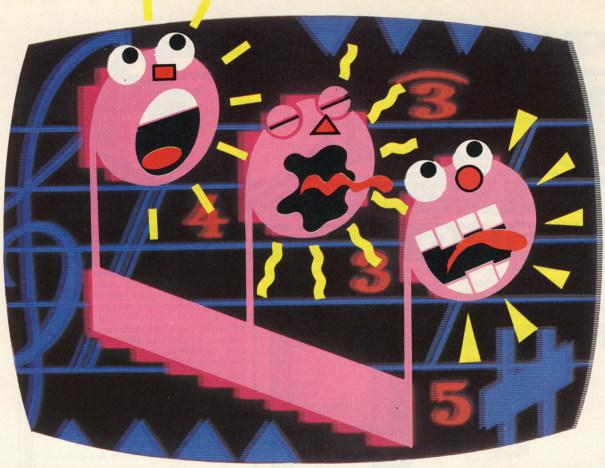

notes all at the same time).

At the press of a button, you can summon up pre-programmed rhythms and bass accompaniments to play along to.

These three rhythm combinations can be speeded up or slowed down.

You can even glissando (so long as you don't hurt yourself.)

That is, make a note slide up in pitch.

You can filter sound: reduce the treble, the bass, or both. You can save, on cassette or disk, a voice or tune for future use.

And, for better sound reproduction, you can connect Music Maker to your hi-fi system.

Music Maker has been designed, like all our software, to get the very best out of Commodore hardware.

It's the first in a series of packages which will fully exploit the Commodore 64's outstanding musical capabilities.

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MAKE MUSIC YOUR FORTE.

Alright, let's all gather round the computer for a good old sing-song.

You'll find the new Commodore 64 Music Maker strikes exactly the right note, whether you're an accomplished musician or whether you are an out-and-out beginner.

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If you can hum and know your ABC, you can start to play famous popular tunes immediately.

No matter if you've never played a note before.

Simply type in the notes from the SFX Tutor Handbook, then tap in the rhythm.

And, before you can even say 'Richard Clayderman', the automatic playback fills the room with music.

Once you've become a 'piano' virtuoso, you'll quickly appreciate the Music Maker's other amazing capabilities.

You can synthesize musical instruments, even create your own 'synth' electronic sounds.

You can play notes polyphonically.

(This is the smart way of saying you can play three different

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LETTERS PAGE

Thanking you . . .

DEAR Commode (sic), Horizons, I am wondering in which computor to get. I am 80% sure that I'm getting a Commodre.

If you have any leaflets and software leaflets to hand out. I would be more than pleased to get some.

Please could you give me leaflets as the last time I had sended off I had to pay for the books, so if you could send me leaflets.

Thanking you,
Roy Askoolum
Tooting Bec
London
WE ARE not having the leaflets. Try asking Commodore for the leaflets. Thanking you.

Print At ideas

YOU MAY be interested in this short subroutine, which gives a PRINT AT function without the need for additional machine code routines.

To print or input at a specific point, use this routine prior to the required command. Let X = the column required, 0 to 39. Let Y = the row required, 0 to 24. Then GOSUB to the PLOT routine, which can be placed at any suitable point in the routine and is as follows:
POKE211,X:POKE214,
Y:SYS58732: RETURN

The values of X and Y can be redefined as required during the program.
Tony Lewis
Abingdon
Oxford

Reset defeated

HERE'S how to stop Paul Baylis' reset switch (December issue). Poke the following numbers into locations 32768 onwards.

32768	A
32769	B
32770	0
32771	0
32772	195
32773	194
32774	205
32775	56
32776	48

where A is the low byte of the address of a machine code program, to handle the fact that the reset switch has been pressed, and B is the high byte.

This stimulates an auto-start cartridge ROM at address A.B.

For instance, enter the code with A = 0, B = 192, then POKE 48152,96. Type a small program like 1 REM (RETURN) and press the reset switch. The screen should clear, but you can still LIST your program.
Antony Walmsley
RAF Cosford
Wolverhampton

Booga-boo-hoo

SIX months ago I purchased the great game Booga-Boo the Flea from Quicksilva. However, after reaching the top of the cave, I cannot find any way to jump through the entrance. Could anyone end months of frustration and offer some advice?
Philip Morgan
South Anston
Sheffield
THIS isn't the only letter we've had asking the same question. Anyone got an answer?

Flying tape

IN YOUR December issue you reviewed the (apparently) fantastic Sublogic Flight Simulator 2 program, and I am very interested in buying a copy. However, you say that because of the complexity of the program it's only available on disk, and I don't own a disk drive. Yet in the same issue, the same suppliers from whom you obtained the review copy on disk are advertising a version on cassette! (Page 10, 64 Supplies Co.)

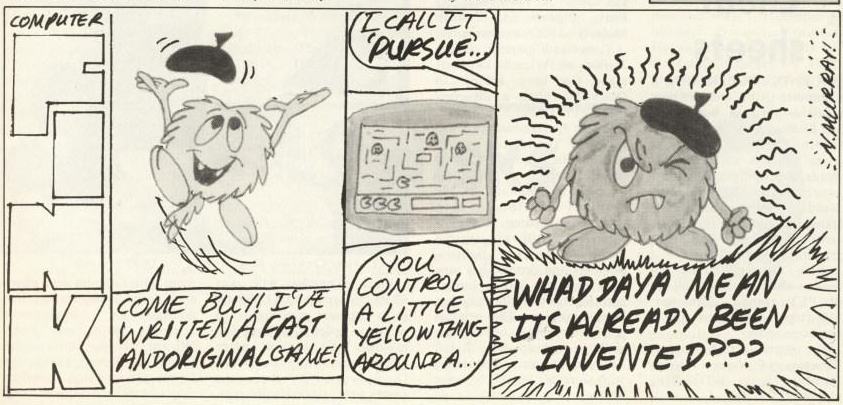
I would be most grateful if you could explain the apparent contradiction, and if you could tell me if the cassette version differs in any way from the disk.
Stuart Mills
Liverpool
Merseyside
YES, 64 Supplies does now offer a version of the Flight Simulator 2 on tape, which wasn't available at the time our disk review was written. The disk version uses a continuous access principle, with new sections of the simulation being loaded as the program continues.

We can only assume that the tape version is substantially the same, but has to be loaded in separate sections. We'll be trying to get hold of a tape version to check it out as soon as possible.

£10 prize letter

BECAUSE we know you're all busy people with plenty to do, we're offering you bribes to spend your valuable time writing to Commodore Horizons. Each month we'll give a £10 prize for the most interesting letter on hardware, software, computing, or life in general. The ball's in your court . . . get writing!

This is the chance to air your views — send your tips, complaints and compliments to Letters Page, Commodore Horizons, 12-13 Little Newport Street, London WC2H 7PP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NEWS DESK

Collins goes soft

BRITAIN'S largest independent book publisher, Collins, has set up a software imprint, Collins Soft. The first acquisition is the **Brainpower** range of programs from Triptych (review in this issue). The existing Brainpower titles will be available from Collins Soft from January 1st, and further titles are in preparation.

Triptych titles cost £19.95 on tape and £24.95 on disk. Titles so far include **Entrepreneur, Numbers at Work, Decision Maker, Star Watcher, Project Planner** and **Forecaster.**

Each title is intended to help micro owners put their machine to a practical application. Each contains a tutorial booklet and program, and Collins Soft's publisher Graham Taylor promises to carry on in an attempt to "influence the direction and focus of software development...away from games and computer literacy...to software that actually does something." Contact Collins Soft at 8, Grafton Street, London W1X 3LA, 01-493 7070.

Cheat sheets

PHOENIX PUBLISHING'S Computer Crib Cards are now available through bookshops at £1.99. The handy-sized folding reference leaflets cover subjects such as keywords, operating commands, graphic and sound commands, colour codes, Basic statements, logical operators, error messages, and programming hints and tips.

The Commodore 64 version also includes a full list of PET graphic characters, SID chip registers and ASCII character codes.

For more details contact Phoenix, 14 Vernon Road, Bushey, Herts, WD2 2JL, phone 0923-32109.

Record-breaking US software

FOLLOWING the lead of Virgin and Island, another record company has opened a software subsidiary.

Ariola's Ariolasoft label debuts with a series of packages from top US houses Broderbund and Electronic Arts. The initial launch features six games which made the top ten in the US Billboard chart, all of which are for the Commodore 64.

Titles include **Choplifter,** in which you have to pilot a helicopter on a rescue mission when 64 UN delegates are kidnapped; **Lode Runner,** a multi-screen ladders-and-platforms game; **Hard Hat Mack,** a construction game; and **One-on-One,** a two-player basketball simulation.

David's Midnight Magic is a pinball simulation for 1 to 4 players, and **Spelunker** is an underground exploration epic. **Raid on Bungeling Bay** is a graphically sophisticated war game, and **Realm of Impossibility** is a 129-room dungeon adventure. All the above games cost £9.95 on tape and £12.95 in disk.

Additionally, **Operation Whirlwind, Murder on the Zinderneuf, Archon and M.U.L.E.** and luxury packages including instruction manuals, selling for £11.95 on tape and £14.95 on disk.

For more details contact Airolasoft, Suite 105/6, Asphalte House, Palace Street, London SW1 01-834 8507.

Tony's travels

TONY CROWTHER, whizz-kid author of **Loco, Blagger, Potty Pigeon** and **Monty Mole,** is on the move again.

Tony and partner Roger Taylor of Wizard Development Co have moved to Quicksilva after a disagreement with Gremlin Graphics. The first Quicksilva game will be **Black Thunder,** a version of Gremlin's Suicide Express (itself a version of Alligata's Loco). The monorail in the original version, which involves speeding along a futuristic railway system avoiding attack by fighters, bombers and drones, has now been replaced with a buggy, and the music on the game has been rewritten. The original software speech effects are still included, but Black Thunder is also compatible with Currah's Speech 64 voice synthesiser.

R to L: Tony Crowther, Roger Taylor, and Quicksilva aide

Black Thunder will cost £7.95 on tape and £12.95 on disk. The next program in the works is called **Gryphon,** and is due for launch after Christmas. Tony's deal with Quicksilva covers these two games only, since his disagreement with Gremlin centred on their desire to sign an exclusive contract. As a development company in its own right, Wizard will be able, in the words of Roger Taylor, to "Free our time and capital to concentrate on new ideas."

Panda bears up

DESPITE LAST year's temporary shortage of Commodore date recorders having finished, there still seems to be a market for interfaces allowing conventional recorders to be used with the 64.

The Panda 20/64 interface costs £17.99, and is produced by PACT International. The interface also works with the Vic 20, and features a special phase switch which enables it to cope with different types of tape recorder and tape quality. It also features two LED's, a red one to show when data is being saved and a green one for loading.

The Panda 20/64 has been tested with turbo-loading programs, and will be available through electrical, television, hi-fi, video and computer shops. Contact PACT International, PO Box 50, Peterborough, 0733-233600.

Computer brains

FIFTEEN-YEAR-OLD Peter Chase of Cambridge has become the Sunday Times Young Computer Brain of the Year.

The competition, sponsored by the Sunday Times and Commodore, involved developing a new idea for a computer application which would benefit society. This year, the theme of computer communications was being emphasised, and Peter's winning idea was "Coastel", a system for sailors and coastguards.

Peter's prizes included a certificate from the Sunday Times, and an SX-64, modem, MCS-801 colour printer and software packages, total value £2000, from Commodore. The prizes were awarded by the President of the British Computer Society, Dr Ewan Page, at a lunch at the Waldorf Hotel in London.

Second prizes included an SX-64, peripherals and software, total value £1730, and for the third prizes there were Commodore 64's, peripherals and software worth £600.

Scope widens for ISP

ISP MARKETING, producers of the games design language Scope, have been bought out by their American distributors Codewriter.

Codewriter's speciality is program generating software, and the company claims to have been leader in the field for four years. Graham Lomax and Allen Pendle of ISP Marketing become Marketing and Technical Directors of Codewriter UK, which will be producing largely disk-based software.

Initial releases include **File Writer, Report Writer** and **Menu Writer,** which enable home or business users to tailor applications packages to their own specification.

Adventure Writer is a text-only adventure game creator based on **The Quill** from Gilsoft. **Dungeons and Dragons Writer** is another adventure creating package, while **Dialog,** is an interactive tutorial program which allows yes/no or multiple choice questions to be set and answered.

ELF, (Easy Language Form), is a visual problem solver, and the original Codewriter program generating package is also available.

The Codewriter factory in Berkshire will be producing software in several European languages, and the company will be interested to see the user-specific programs written using their packages and consider them for commercial marketing.

Prices will be "in line with UK ranges", and there's a demo disk available from the company for £9.95. Contact Codewriter, PO Box 33, Basingstoke, Hampshire, 0256-27844.

L9 disks

ALL SIX OF the popular Level Nine adventure games have now been made available in disk format.

The Commodore 64 games include **Return To Eden,** the latest release, the space adventure **Snowball, Colossal Cave** and the **Middle Earth** trilogy.

The disk versions will cost £11.95, and cassette version owners can exchange them for disks with a charge of £2.50 to cover costs.

The new Level Nine catalogue lists all the programs, and comes in an A3 poster format. The catalogue illustrations will be changed every two months, and if you're intereted in getting a copy you should send a medium sized s.a.e. to Level Nine, 229 Hughenden Road, High Wycombe, Bucks, HP13 5PG.

CBM $25m payout

MORE DETAILS of Commodore International's purchase of Amiga have been announced. A recent quarterly statement reveals that around $25m in cash and stock has been paid to acquire the company, which will gain Commodore 27 engineers and the rights to the much-touted Lorraine personal micro.

Financial analysts have responded cautiously. Technical details on the Lorraine, revealed in a previous issue of Commodore Horizons, are promising, but it will face stiff competition from the Mackintosh and IBMPC. Commodore share prices fell after the announcement of the purchase details, though stocks were said to be at a high level.

The lawsuit against Amiga by the chairman of Atari, Jack Tramiel, former head of Commodore, is still pending. Tramiel alleges that technology developed by Amiga for Atari is being transferred to Commodore under new arrangements. Commodore executives say that the lawsuit won't delay the debut of the Lorraine.

New man

COMMODORE UK has appointed a new Marketing Manager, David Gerrard. Formerly with electronics giants Plessey, Gerrard was involved with the company's business computer project. He was also employed as UK marketing manager for Texas Instruments calculators and watches.

His responsibilities will include marketing of home computers, software and peripherals, but will also extend into Commodore's attempt to crack the UK business market.

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White wizard

The latest in the range of talking games from Tymac is Gandalf the Sorcerer, a Tolkeinesque exercise in magical mayhem. In common with the whole Tymac range, Gandalf features very skilled, colourful graphics programming, combined with the fashionable gimmick of software speech. It's a very slick package, though the game

isn't that original.

You control the sorcerer Gandalf, moving him around the battlements of his magic castle and flinging firebolts at the attacking Lizardmen. There are lovely little mushroom explosions when you score a hit, and occassionally you have to ascend the magic tower to draw extra power from a magic star, and a poisonous spider tries to gnaw your leg.

Should the lizardman penetrate the castle and kidnap your apprentices, you must follow them outside and zap the lizards while collecting gold coins. Leave it too long and an ostrich comes along and steals the coins. An Ostrich? What's that doing there . . .?

Overall, very slick, though not a great challenge.

Program: Gandalf, 64
Supplier: Tymac
Price: £9.95
Graphics: ★★★★★★★
Sonics: ★★★★★★
Gameplay: ★★★★★★

Radio-active

One of those games where it's necessary to arrange a free weekend to be sure of completing it, Countdown to Meltdown features a very impressive perspective 3-D effect which will draw a gasp at first sight.

The scenario is a 2000-room nuclear plant threatened with disaster as the core begins to overheat. You control a number of androids which must be led to the core and used to neutralise it.

Each chamber can be viewed from a number of different angles, and will contain equipment which can be either useful or dangerous. Your android can only carry a certain amount of equipment, so choose carefully — it would be frustrating to get right through to the core only to find that you hadn't picked up the necessary Glug Drill or Snibber along the way.

The animation is quite good, though the figures are small.

Particularly appealing is a mound of sludge called ARP which drains your energy, though there are also robot soldiers lurching around which have to be atomised.

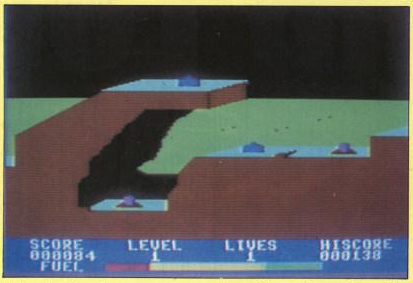
A very nice challenge for the sort of game player who enjoys making maps, and who doesn't mind withdrawing from human contact for the kind of time it will take to complete this complex game.

Program: Countdown to Meltdown, 64
Supplier: Creative Sparks
Price: £7.95
Graphics: ★★★★★★
Sonics: ★★★
Gameplay: ★★★★★★★★

Future tense

Yet another from the masters of the cheapo game, and this one's a little cracker. Daft title, conveying nothing of the game itself, which is based on a little-known vector-scan arcade game, Gravitar.

Using the attitude controls and thrusters on your dinky spaceship, you must first manoeuvre out of an underground base, then, avoiding UFO's, land on one of four planets. The scene then changes to the landscape of



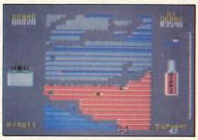
that planet, where you must pick up fuel pods with your tractor beam, avoiding missiles from gun emplacements and the effects of gravity which threaten to pull you into the ground.

At the risk of sounding hostile to the many respectable companies who are doing marvellous things in the £6-£7 price range, 1985 is exceptionally playable, much more fun than many 10,000-level megagames, and although the idea isn't strictly speaking an original one I don't remember anyone having ripped it off in a Commodore version before. Full marks to Mastertronic for producing another little classic, which you should all dash out and buy at once.

Program: 1985, 64
Supplier: Mastertronic
Price: £1.99
Graphics: ★★★★
Sonics: ★★★★
Gameplay: ★★★★★★★

Inkworm attack

Quinx is a pleasantly unusual offering from the underrated Supersoft. It's a pretty straightforward test of speed and joystick dexterity, in which the field of play is not some intergalactic wasteland, but a sheet of writing paper.



You play Arthur Crown, a food economist persecuted by nightmares in the midst of his exams. Your sheet of paper must be defended at all costs from the ravages of the Inkworms. This you can do by covering up their inky markings with TIPPIT correcting fluid. Watch out, though, for the paper-eating monsters, and don't over-eat. Giving way to the temptations of the tasty snacks appearing at the side of the paper can lead to a visit from the dreaded Dentist.

Unusually clear graphics and nice squishy sound effects as you stamp on the inkworms make Quinx a definite goer.

Program: Quinx, 64
Supplier: Supersoft
Price: TBA
Graphics: ★★★★★★
Sonics: ★★★★★★
Gameplay: ★★★★★★

SOFT★HITS

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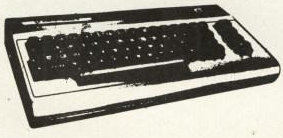

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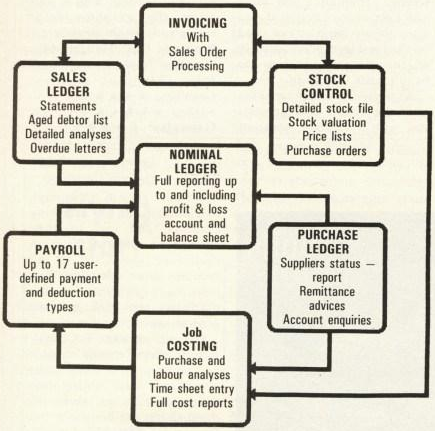

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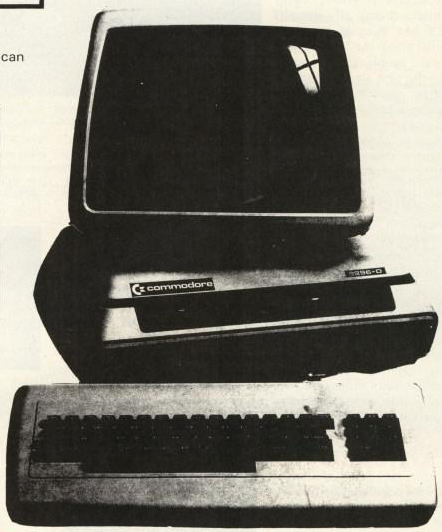

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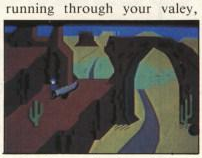
SOFT★HITS

That's all folks!

Based on the same sort of concept as the old Road Runner cartoons, Cliff Hanger is a good idea which doesn't quite come off. The backgrounds are drawn in a cartoon-like style, though the animation of the characters isn't up to the same standard.

The idea is to stop a bandit running through your valey,



using the standard methods of the cartoon world; dropping rocks on his head, blasting him with a cannon, squashing him with an anvil, and so on. You must figure out how to use the objects found in the first ten screens. Thereafter you must also take evasive action if you want to survive a screen, and on the final level every game in which you fail to stop the bandit costs you a life.

At times the computer takes over the action and presents you with a vignette, some of which are very funny. The problem is that playing Cliff Hanger is like hearing an hilarious joke — for the tenth time. The novelty soon wears off, and without a little variation the graphics aren't enough to sustain the interest.

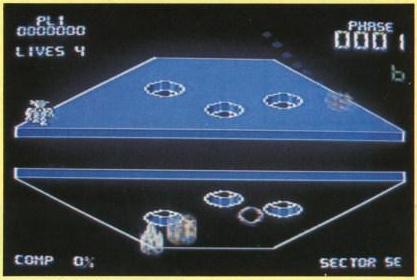
Program: Cliff Hanger, 64
Supplier: New Generation
Price: £7.95
Graphics: ★★★★★★
Sonics: ★★★★★
Gameplay: ★★★★★

8,192 blows

We always expect great things from Taskset here at Horizons HQ, and if CADCAM Warrior lacks something in originality it certainly makes up for it in scope.

Incorporating an amazing 8192 screens (I know, 'cos I counted them all myself) CADCAM Warrior is in the familiar "zap the baddies and solve the problem before going on to the next screen" mould.

You control a dinky robotette which is plunged into a complex CADCAM (computer aided design and computer aided manufacture) machine in order to find the missing cryo-wafer module on which are encoded the human element missing from the machine's design programs.



The internal defence systems don't like this, of course, and they put up a fierce battle. The attacking sprites, in the shape of screws, energy bolts, and indefinable metal objects, are nicely animated and respond well to a good zapping. The scenes all tend to look pretty much the same, though; a sort of metallic amphitheatre pierced by machined holes through which your droid drops to reach the underside.

On some screens it's enough to eliminate all the attacking elements, and you are then allowed to select a direction option to move on. It all becomes more complicated as you reach the heart of the machine, but you get the general idea.

Overall, paradise for multi-screen shoot-'em-up freaks, and purgatory for those of us who don't have entire days which can be set aside for mega-zapping.

Program: CADCAM Warrior, 64
Supplier: Taskset
Price: £9.95 cassette, £12.95 disk
Graphics: ★★★★★
Sonics: ★★★★★
Gameplay: ★★★★★★

Manic monarch

Two popular trends have come together in one package from English Software. The first is the vogue for spoofs on the monarchy, exemplified in Bad Taste Software's offering Di's Baby (reviewed last month). The second is the eternal ladders-and-platforms game, kicked off by Manic Miner and still leaping around though it's well past its prime.

However, if you're going to do a LAP you should at least do a good one, and Henry's House is super. Little Henry, a miniature prince, sets out to investigate the mysteries of his palace. Each room contains hazards which must be avoided, and goodies which must be collected in order to progress to the next level.

There are eight screens, each drawn with excellent attention to detail and a cartoon-like style. The animation of the little prince and the hazards,

such as clomping boots, whirling Happy Faces and snapping scissors, is very good. Sound effects are OK and there's a nice little sequence where Henry trots from one room to another.

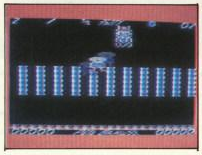
Overall it's quite enjoyable, and has the sort of "just-one-more-game"-ish quality which makes platform games so popular. It certainly couldn't be accused of being original.

Program: Henry's House, 64
Supplier: English Software
Price: £8.95
Graphics: ★★★★★★★
Sonics: ★★★★
Gameplay: ★★★★★★

Octoplus

Proving that it is possible to do good things with the unexpanded Vic, Fatty Henry is a bizarre effort from Software Projects featuring an octopus in a cooker. It doesn't look like an octopus, more like a spaceship, but that's not the point.

Thwitchy Thwilly, an octopus, is trapped in a cooker. He has to pick up drops of condensation from



the top of the cooker, convey them to the bottom and use them to douse the flames before he's roasted. There are ten cookers which include additional hazards such as rotating spits, bits of food and the dog Fatty Schizo Henry. Are you with me so far? Right. The spaceship-octopus is very colourful and the animation is very smooth as it zooms around the cooker. The sound effects are adequate and although I didn't get as far as meeting the eponymous Fatty Henry, I managed to douse quite a few cookers without losing interest before I was finally done to a turn. A jolly good little game, which has quite put me off the idea of ordering squid from the local Chinese takeaway.

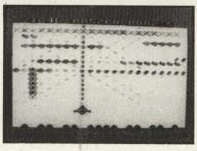
Program: Fatty Henry, Vic 20
Supplier: Software Projects
Price: £5.95
Graphics: ★★★★★
Sonics: ★★★★★
Gameplay: ★★★★★

SOFT★HITS

Zap mania

Some of you will remember Jeff Minter's Hell Gate, a shoot-'em-up of such staggering violence that it should have come with a government health warning. Just to prove that Llamasoft don't have the copyright on software for blaster maniacs, Software Super Savers have released the Revenge of the Quadra, or to put it more accurately, it probably escaped.

From the second you hit the fire button this one is all action. Across the top of the screen move spiderlike ships, protected from your lasers by bands of asteroids. Unless you manoeuvre your ship skillfully enough to blast the invaders, they'll drop to the ground and kidnap humanoids. You have a few moments to save the humanoids once they're on their way up, but the spiderships have a nasty tendency to blow you to pieces with a sneaky sideways shot.



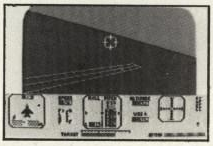
The scrolling message — which is difficult to watch while you blast the meanies — states that this isn't a Llamasoft game, contains no rabbits, and is fantastic. I can only concur wholeheartedly. If nothing in life amuses you more than a few pleasurable moments blasting hell out of the pixels, this is the one for you.

Program: Revenge of the Quadra, Vic+ 8K
Supplier: Software Super Savers
Price: £2.99
Graphics: ★★★★★★
Sonics: ★★★★★★★
Gameplay: ★★★★★★★

Flying start

This isn't the most complex, realistic or demanding flight simulator for the 64; the honours in those categories must go to Sublogic's Flight Simulator 2. Fighter Pilot may, though, qualify as the most exciting flight simulator; instead of just stooging around the sky looking for a landing site, you get the chance to kill something.

The graphics aren't as neat as the Spectrum original, but the sound is of course much better. You have a window view from



an F-15 fighter, and you can select a number of mission options.

In the full version of the game, you must take off, use your map mode and radar to locate enemy planes, plot a course to intercept them, shoot them down, return to base and land safely.

The controls are well-chosen, though it helps to have a joystick, and the landing sequence is so realistic it's terrifying. I plummeted into the tarmac about twenty times before I got the hang of it — glide in at low level, watch your airspeed indicator to avoid stalling, and remember to put your wheels down.

Excellent instructions which incorporate a good deal of useful and, supposedly, accurate factual info on the F-15, help to make Figher Pilot a real killer. I can't wait to get my hands on the chopper simulation Tomahawk.

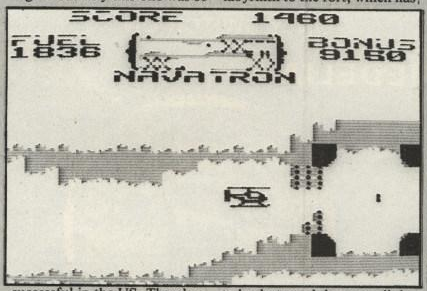
Program: Fighter Pilot, 64
Supplier: Digital Integration
Price: £9.95 cassette, £14.95 disk
Graphics: ★★★★★★
Sonics: ★★★★
Gameplay: ★★★★★★★★★

Apocalypse now

Yet another hot favourite from the States, Fort Apocalypse's best feature is the randomness of the challenge it presents, making each game different.

You pilot a jetcopter around an underground labyrinth, avoiding missiles and tanks, dropping bombs and firing missiles, negotiating laser traps and searching for your 18 lost comrades.

The scrolling screen is a familar feature now, so it doesn't have as much impact as it would have when the game was first released. As a result it's a bit difficult to figure out why this one was so



successful in the US. There's a bit of variety involved when you have to land to refuel, or when you get right through the labyrinth to the fort, which has to be destroyed, but overall the game is a little weak.

The sprite graphics aren't half as good as, say, Falcon Patrol 2, the sound effects are disappointing, and there's no real attempt made to create an illusion of 3-D.

In its favour, there's a nice Defender-style navigational radar screen, and a high level of destruction and desolation. It will certainly please many games players, but Fort Apocalypse doesn't manage to excite much interest compared to many of the other US Gold offerings.

Program: Fort Apocalypse, 64
Supplier: US Gold
Price: £9.95 cassette, £14.95 disk
Graphics: ★★★★★
Sonics: ★★★★★
Gameplay: ★★★★★

Jungle bungles

This is a five-screen leaper-and-ducker in which Jungle Jim sets out to rescue Jane from the cannibals. Screen one sees Jim, pursued by a hungry lion, leaping and ducking to avoid spears which will otherwise impale unerringly. Screen two, like Pitfall, has him leaping from vine to vine (and the lion, on the lookout for breakfast, snaps him up he misses the connecting liana). Screen three is all swimming and crocodiles, screen four a race up a mountain dodging boulders, and lastly there's the cannibals themselves to

contend with. Jane plunges into the pot of boiling stew if you don't overcome all the hazards in time.

Unobjectionable, but this one isn't going to ruffle your loincloth too much. Nice version of Rivers of Babylon on the soundtrack.

Program: Jungle Quest, 64
Supplier: Solar Software
Price: £7.95
Graphics: ★★★★★★
Sonics: ★★★★★
Gameplay: ★★★★★

PSYCHEDELIA

PSYCHEDELIA - A STEP BEYOND GAMES

YOU CANNOT WIN
YOU CANNOT LOSE
ONLY ENJOY

PSYCHEDELIA — BEYOND COMPETITIVENESS

THERE IS NO FRUSTRATION
THERE IS NO KILLING
ONLY PLEASURE!

PSYCHEDELIA — AN ENTERTAINMENT

SWITCH ON TO MUSIC
SWITCH ON IN THE DARK
ONLY SWITCH ON!

PSYCHEDELIA — A DANCE WITH RAINBOWS

Jeff Minter

AVAILABLE FOR CBM 64, C 16, VIC 20

SHORTLY AVAILABLE FOR ATARI, SPECTRUM, AMSTRAD

Llamasoft

ORIGINAL SOFTWARE DESIGN

49 MOUNT PLEASANT, TADLEY, BASINGSTOKE, HANTS.

Opening up the world of networks

Hardware and software reviewed by ***Brian Lloyd***

MAIN-FRAME business computers have long had the ability to communicate with each other, passing information backwards and forwards at will. Until recently this has not been possible where the home micro was concerned. However, it is now possible for the humble home micro to communicate with another micro, and also talk to, and even be answered by, their giant brothers.

This opens a very big door for the home computer, for out there is a wealth of information and facilities waiting for you. The list of things you can do is endless, and would take up several magazines the size of this one to cover them. Among the networks that await you are Prestel, Micronet 800, Bulletin Boards, and the latest innovation by Commodore, Compunet.

What can you do on all these systems? Well, have you ever wished you could get information on your dream holiday, or book a theatre ticket, or see what's new in software for your computer and if you liked what you saw, down load it? All this is now yours for the asking. Before you can do all of these things you must have some way of connecting your computer to the outside world. To do this, you will need a MODEM to connect your computer to British Telecom's telephone network.

A word of explanation of the various systems available to you would not go amiss at this time. The main baud rate is 1200/75. This means you receive at 1200 bytes per second and transmit at 75. This is the system that Prestel and Micronet use, and some Bulletin boards. Probably the next most used baud rate is 300/300 full duplex, as this is used by most bulletin boards and user to user communications. Finally there is 1200/1200 half duplex — this means you receive and transmit at 1200 baud but can only operate in one direction at the time. 1200/1200 baud half duplex is used mainly for user to user communications.

Systems

Now for the various systems available. Prestel is run by British Telecom and provides every kind of information you could imagine, as well as allowing you to book your next holiday or just browse through the latest share prices. Incorporated in the Prestel network are various other organisations such as Micronet 800. This service is aimed mainly at the computer user and provides such things as downloadable software as well as many other facilities. Bulletin boards are run by volunteers who are prepared to give up their spare time and quite a bit of money, to run these excellent services, mostly free of charge to the user. There are so many bulletin boards up and down the country it would be impossible to cover them all, but what can be said is that they all provide a very friendly information service on a variety of subjects.

Choosing the right modem is not an easy task, as it may not work on your computer, or it may not have the facilities to get onto the services you require. I will concentrate on modems for the Commodore 64, but what follows is common to all computers.

There are several aspects to consider when buying your modem and they are:

(1) Is it compatible with my computer?

(2) Can I get an interface and software to make full use of it?

(3) What do I want to use the modem for and will it carry out that task?

(4) If I want to down load software are there facilities to do so?

(5) Can I send messages or programs to other home computer users?

(6) Is it good value for money?

(7) If I change my computer will it still work?

The first modem we will look at is the TELEMOD 2 together with the CBM 64 Comms Pack. This is the one supplied by Micronet 800 and the only one recommended for downloading their software. The Telemod 2 is a very neat unit, just the right size to stand a telephone on. On the front there are just two switches and three LEDs. One switch is to control the on/off line function whilst the other controls the baud rate modes. The LEDs are for power on/off, carrier signal and line on/off. The CBM 64 Comms Pack comes in a neat plug-in unit that fits snugly into the cartridge port. Connections are very simple. A telephone lead supplied plugs into a BT wall socket, whilst your telephone plugs into the back of the modem. The next connection is from the modem to the cartridge. Finally plug the modem into the mains supply.

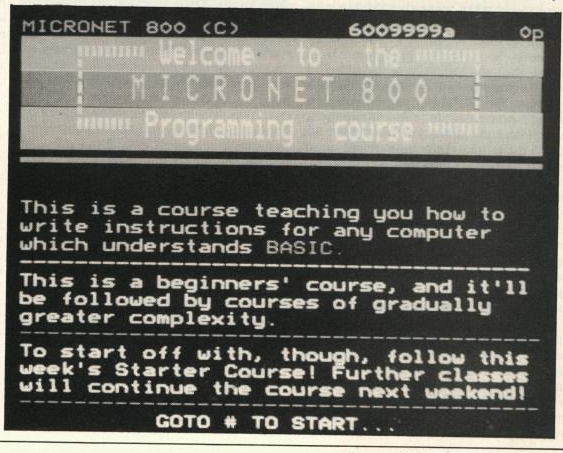
The Comms Pack takes care of the RS 232 interface and the operating software. On power up you are presented with a menu and by selecting one of the options you are taken into the sub menus. The instruction books are a bit sparse, but with the easy to follow menu they are not really required often.

The whole operation from first power up is menu driven, and whatever option you choose you are guided to the next steps to take.

Functions

From the menus you can see there are a lot of functions that are available to you. Although the manufacturers claim it to be mainly a Prestel modem you will see from the options they are being quite modest. It can be used for Prestel, Micronet 800, Bulletin Boards, or any other system on 1200/75 Baud; User to User 1200/1200 Baud Half Duplex; Chat Mode 1200/1200 Baud Half Duplex.

Another modem from the OE Ltd stables is the Telemod 3. This is a multi baud rate modem with 300/300, 1200/75 full duplex and 1200/1200 baud half duplex. An added feature is auto answer; that is, if it is left on in the auto mode it will answer the phone with a tone so that a message can be left on your computer, or, with the right software, you could run your own bulletin board. The Telemod 3 works with the CBM 64 Comms Pack but requires an overlay program to run on 300/300 baud. It's the ▶


MICRONET 800 (C) 6009999a 0p
Welcome to the
MICRONET 800
Programming course
This is a course teaching you how to write instructions for any computer which understands BASIC.
This is a beginners' course, and it'll be followed by courses of gradually greater complexity.
To start off with, though, follow this week's Starter Course! Further classes will continue the course next weekend!
GOTO # TO START...

◀ same size as the Telemod 2 but has two switches, one for auto or manual answer and one for on/off line. There is also a knob to switch between the different baud rates and an impressive ten LEDs. Facilities are as for the Telemod 2 but with the added features of 300/300 baud full duplex, so you will be able to use the bulletin boards and information services that use this system. You can, of course, transfer files user to user on the same baud rate, slower but easier than 1200/1200 half duplex.

The Tandata TM 110 modem is quite large as modems go but nevertheless quite smart. There are no controls to worry about as everything is software controlled. The only indication that the modem is on are the two LEDs in the front right hand corner.

The interface and software come on a small PCB with all components exposed and plugs into the cartridge port. The interface board, in my opinion, should have been put into a case as plugging it in and out of the cartridge port is not easy and it could be damaged. The TM 110 has auto-dial and is capable of storing eight telephone numbers plus your ID and password. Entering the telephone numbers is quite simple, and is done in the off line mode from within the program. Once entered the modem retains the numbers in its memory with the aid of built-in batteries. Once you have mastered the tricky art of plugging in the interface board and connected up the relevant cables you may then power up the computer.

Options

On power up you are presented with a menu giving various options. Before you can proceed you must set up the output devices — disk drive, printer etc. All operations are menu driven and are fairly simple to follow.

On test, the Tandata TM 110 worked well except when it came to downloading software. Downloadable programs have to be tokenised when using the TM 110 with the Commodore 64 interface pack. To get your programs to run you first have to download a tokeniser program from Prestel, then you have to type in and save a short program from the manual or from a listing on Prestel. This is where you may have some problems, for the program in the manual and the program listing given on Prestel differ and the manual is not at all clear on how to use the tokeniser programs. With trial and error I did manage to tokenise a program and resave it.

The TM 110 is a 1200/75 baud modem but with an overlay program available at extra cost it will operate on 300/300 baud. Again, it can access Prestel, Micronet 800, Bulletin boards, or any other system operating on 1200/75 baud or with the overlay program 300/300 baud services.

My big worry with this package is the interface board. I would have been much happier if it had been in a case. Otherwise on test it proved very easy to use and apart from the size of the modem it is very neat.

The Miracle Technology WS 2000 modem is truly a multi standard modem with every type of baud rate and system you are ever likely to need in the UK or abroad. All controls are very clearly marked on the front of the modem and are controlled by three knobs. There is also a list of add-on accessories available such as auto-dial and auto-answer plug-in boards. To use the modem with the CBM 64 you will have to decide what software you are going to use with it, as only a listing is supplied with the modem and this only allows 300/300 baud operation. The only options I am aware of do not allow full use of the many options available on the WS 2000. What software you use determines what interfaces you will need and, in fact, what add-on accessories you can use. One option that works very well is the CBM 64 Comms Pack with the Telemod 3 cable and the 300/300 baud overlay program from OE Ltd described earlier. This will allow the modem to be used on 1200/75, 1200/1200, 300/300 baud rates, but will not support the auto-dial and auto-answer boards.

Another alternative is disk based software from PSI. To use PSI's software you will require the RS 232 serial interface supplied by Miracle Technology, as this software uses the user port to communicate with the modems. As supplied the disk based software will support 300/300, 1200/1200, 600/600, and 1200/75 baud operation. One of the unique features of this program is that it allows you to store a vast amount of telephone numbers on the program disk. When the program has loaded the pages of names stored are presented on the screen, just pressing the letter next to the service you require will automatically dial up the number if the auto-dial board is fitted. If not, you just dial the number displayed yourself.

Dialling

There is also a ring-round facility that allows you to choose several numbers you want to try and will ring each one in turn until it gets an answer. This is most useful when dialing up Bulletin Boards as they always seemed to be engaged. The next alternative I discovered by accident, but it might prove to be the cheapest way of using the WS 2000. The software and interface that is supplied as an extra for the Protek 1200 (see next review) will work just as well on the WS 2000, although you will have to change the plug from the 5 pin din supplied to a 25 pin D connector. However for the price it is well worth it.

The WS 2000 worked well on all of the options I tried, and can be used on any system for which PSI can supply suitable

Product	Supplier	Price
Telemod 2	O.E. Ltd, North Point, Gilwilly Industrial Estate, Penrith, Cumbria, CA11 9BN.	£69.95
CBM 64 Comms pack	O.E. Ltd	£64.95
Telemod 3	O.E. Ltd	£175
TM 110	Tandata Marketing, Albert Road North, Malvern, Worcs, WR14 2TL	£113.85
CBM64 board	Tandata Marketing	£48.90
300/300 baud overlay prog	Tandata Marketing	£39.10
WS2000	Miracle Technology Ltd, 10/12 St Peter's Street, Ipswich, IP1 1XB	£129.95 + VAT
RS232 i/f	Miracle Technology	£19.95 + VAT
Protek 1200	Protek Computing Ltd, 1A Young Square, Brucefield Industrial Estate, Livingstone, West Lothian, EH54 9BX	£59.95
I/F + software	Protek Computing	£14.95
Compunet modem	Commodore, 1 Hunter's Road, Weldon North Industrial Estate, Corby, Northants	£99.95 inc. 1 year Compunet membership

software.

Miracle Technology has come up with an excellent modem, but has unfortunately neglected the software side. A bit like a car without an engine. If you decide you need more than the baud rates that are found on more traditional modems then this is the one for you. However, if you just want Prestel then this would be an expensive way of getting it.

The Protek 1200 is quite different from the modems we have looked at so far; this one is an acoustic modem so therefore does not require one of BT's new plugs to work. The modem is completely self contained and only needs four AA type batteries to power it. The Interface and software pack come as an optional extra, and together with the modem, is by far the cheapest package I have seen for the Commodore 64. The modem does require you to have a telephone that has round ear and mouth pieces so is unsuitable for trimphones.

The software is cassette based and once loaded is menu driven and supports auto log on/off, save and load frames, change ID and user to user options and has 1200/75, 1200/1200 baud. However the software does not allow downloading of telesoftware. The user to user seems to be unique as it allows machine code programs to be loaded into the computer at a different location to which it was saved and also allows the receiving computer to relocate it when saved. This option would be quite useful when two different computers are being used. However to use this option both computers would have to be using the same software, but not necessarily the same modem.

The modem itself is quite straightforward and is typical of acoustic modems in operation. All that is required of the user is to make sure the telephone handset is pressed firmly into the cups of the modem and switch to the baud rate required, the rest is handled by the software (except dialling the telephone). On test, the program and the modem worked well. If you want a portable modem then this would appear to be the one to suit your requirements. It can be used for Prestel, Micronet 800, Bulletin boards on 1200/75 baud, plus 1200/1200 baud half duplex user to user.

The Protek 1200 must be one of the cheapest ways of getting into Prestel or other 1200/75 services. Despite the price the whole unit is more than adequate for

the job if you are not interested in downloading programs. You will also be equipped for 1200/1200 half duplex user to user.

The last modem we are going to look at is completely different in many respects to all the others we have looked at. Commodore's own system for the Commodore 64 is the Communications Modem. Where the Communications Modem differs from all the other modems is that it allows you to get into Commodore's own system designed especially for the CBM 64, called Compunet. Buying the modem on its own however is not going to get you very far. When your modem arrives it will be accompanied by an application form to join Compunet, which you will have to fill in and send back together with an open bankers standing order. You will then be sent your ID and pass word to allow you to use all Compunet's facilities.

To access Prestel from Compunet you will have to download a viewdata program. This also applies to user to user communications. At the time I reviewed this modem the programs were free but I understand that these will be charged for at a later date.

Back to the good points. As I said earlier there is a lot of good quality free software plus lots of commercial programs at discount prices. The Jungle area, as it is known, is for Compunet users to use as they wish. Programs can be uploaded and sold although Compunet take a share of the price you charge. There is a mailbox so you can send messages to other Compunet users. The list of uses and facilities is quite long. I must at this point warn you that if you want to use Compunet during the day it is very expensive (seven pounds per hour) so you will have to hide it from the kids when they are on holiday!

The modem cannot be used for Prestel and user to user communications without additional software which again you cannot obtain without joining Compunet.

Decisions

It may be very difficult to make your mind up what modem to buy, as none of the ones I looked at would allow you to access all the options open to you. Some of the modems were capable of operating on many different baud rates, but did not have the software to drive them. No other modem except Commodore's own would be capable of accessing Compunet. Although most of the software for the modems was written by Y2 Computing, it did not seem possible to use different types of software on user to user communication, which means if you intend sending messages or programs to any particular person you would both have to buy the same software.

I was perhaps most impressed with the Minor Miracles modem, considering the high level of software support from PSI. We'll be looking in future articles at some of the services you can access with a modem, and this may help to make the choice of product easier. ■

Lazy rides TERMINAL Jones again

*Terminal's **David Whittaker** presents a new screen for his idle hero*

THIS MONTH'S Star Game for the 64 is from David Whittaker of Terminal Software.

Terminal started up four years ago as Terminal Music, a cassette, label and distribution business. It was theidea of Andy Hieke to explore the computer software field, and the company soon developed through the mail order field into direct selling to retail outlets.

Early Terminal games such as **Super Dogfight** and **Super Gridder** made way for more ambitious and advanced programs like **Star Commando** and **Plumb Crazy**.

David Whittaker's programming career developed via an interest in electronic music. He now has four synthesizers, and also plays guitar. During a break between tours with various bands in 1982 he took up programming on the Vic 20, and soon produced games such as Mr Micro's **Humphrey.** David, now 27, is working in 6502 and Z80 machine code, and is looking foward to using 16 and 32 bit computers. Commodore themselves market his games **Humphrey, Mayhem** and **Punchy,** but many would say that his greatest achievement to date is Terminal's **Lazy Jones.**

Lazy Jones is an idle hotel cleaner who would rather play video games than do any work. Terminal's game allows you to control Lazy Jones around the floors of his hotel, trying out each video game and avoiding the manager and the deadly cleaning trolley.

David has written a new screen for Lazy Jones which you can type in and play yourself.

The listing is in two parts, one to poke the character/code data and one for the game itself. Since there's a lot of data to type in, David's offering a copy of the program on cassette to anyone sending a cheque or postal order for £1.99 to him at 30 Cedar Place, Lower Broughton, Salford, M7 9NR.

To play the game use a joystick in port 2. You must control your missile projectors, which move left and right and up and down, and fire when the spinning artefact is aligned between them. Each time you hit the artifact it changes colour and you score points. You are playing against a time limit, so shoot fast if you want a high score! ■

Program 1

```
0 REM ***** PROG1 *****
1 PRINTCHR$(147)"JUST A MOMENT..."
2 FORR=20160TO22996
3 READD:Q=Q+D
4 POKER,D
5 NEXT
6 IFQ<>251630THENPRINT"ERROR IN YOUR DATA.":END
7 PRINT"DATA SEEMS O.K."
8 PRINT"NOW LOAD PROG2":END
5000 DATA 10, 170, 160, 10, 170, 160, 10, 170, 160, 10, 170, 160, 10, 170
5001 DATA 160, 10, 170, 160, 10, 170, 160, 10, 170, 160, 10, 170, 160, 10
5002 DATA 170, 160, 10, 170, 160, 10, 170, 160, 10, 170, 160, 10, 170, 160
5003 DATA 10, 170, 160, 10, 170, 160, 0, 0, 0, 0, 0, 0, 0, 0
5004 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5005 DATA 0, 0, 0, 21, 85, 84, 42, 170, 168, 42, 170, 168, 42, 170
5006 DATA 168, 10, 170, 160, 10, 170, 160, 10, 170, 160, 10, 170, 160, 2
5007 DATA 170, 128, 2, 170, 128, 2, 170, 128, 0, 0, 0, 0, 0, 0
5008 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5009 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5010 DATA 0, 0, 0, 85, 85, 85, 85, 85, 85, 42, 170, 168, 10, 170
5011 DATA 160, 2, 170, 128, 0, 170, 0, 0, 0, 0, 0, 0, 0, 0
5012 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5013 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5014 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 170, 0
5015 DATA 2, 170, 128, 10, 170, 160, 42, 170, 168, 85, 85, 85, 85, 85
5016 DATA 85, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5017 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
```

```
5018 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 2, 170, 128, 2
5019 DATA 170, 128, 2, 170, 128, 10, 170, 160, 10, 170, 160, 10, 170, 160
5020 DATA 10, 170, 160, 10, 170, 160, 42, 170, 168, 42, 170, 168, 21, 85
5021 DATA 84, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5022 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 255, 255
5023 DATA 255, 255, 255, 255, 255, 255, 62, 99, 99, 127, 99, 99, 99, 99
5024 DATA 126, 99, 99, 126, 99, 99, 99, 126, 62, 99, 96, 96, 96, 96
5025 DATA 99, 62, 126, 99, 99, 99, 99, 99, 99, 126, 127, 99, 96, 124
5026 DATA 96, 96, 99, 127, 127, 99, 96, 124, 96, 96, 96, 96, 62, 99
5027 DATA 96, 96, 103, 99, 99, 62, 99, 99, 99, 127, 99, 99, 99, 99
5028 DATA 126, 24, 24, 24, 24, 24, 24, 126, 3, 3, 3, 3, 99, 99
5029 DATA 99, 62, 99, 102, 108, 120, 108, 102, 99, 99, 96, 96, 96, 96
5030 DATA 96, 96, 99, 127, 99, 119, 127, 107, 99, 99, 99, 99, 126, 99
5031 DATA 99, 99, 99, 99, 99, 99, 62, 99, 99, 99, 99, 99, 99, 62
5032 DATA 126, 99, 99, 126, 96, 96, 96, 96, 127, 191, 223, 239, 247, 251
5033 DATA 253, 254, 126, 99, 99, 126, 120, 108, 102, 99, 62, 99, 96, 62
5034 DATA 3, 99, 99, 62, 126, 24, 24, 24, 24, 24, 24, 24, 99, 99
5035 DATA 99, 99, 99, 99, 99, 62, 99, 99, 99, 99, 99, 54, 28, 8
5036 DATA 99, 99, 99, 99, 107, 127, 119, 99, 129, 129, 129, 255, 129, 129
5037 DATA 129, 129, 99, 99, 99, 63, 3, 99, 99, 62, 127, 99, 6, 12
5038 DATA 24, 48, 99, 127, 255, 192, 207, 207, 207, 207, 207, 207, 255, 0
5039 DATA 255, 255, 255, 255, 255, 255, 255, 3, 243, 243, 243, 243, 243, 243
5040 DATA 207, 207, 207, 207, 207, 207, 207, 207, 243, 243, 243, 243, 243, 243
5041 DATA 243, 243, 0, 0, 0, 0, 0, 0, 0, 255, 255, 255, 252
5042 DATA 252, 255, 255, 255, 0, 54, 54, 36, 0, 0, 0, 0, 16, 16
5043 DATA 8, 8, 4, 100, 152, 0, 0, 0, 12, 12, 12, 30, 63, 30
5044 DATA 0, 0, 121, 97, 120, 97, 121, 0, 0, 0, 179, 179, 227, 179
5045 DATA 179, 0, 0, 0, 126, 24, 24, 24, 24, 0, 0, 0, 0, 0
5046 DATA 0, 0, 0, 30, 0, 0, 231, 0, 1, 3, 0, 0, 230, 0
5047 DATA 0, 36, 0, 0, 60, 0, 0, 66, 0, 0, 153, 0, 0, 153
5048 DATA 0, 0, 153, 0, 0, 153, 0, 0, 255, 0, 0, 102, 0, 0
5049 DATA 108, 0, 0, 254, 0, 1, 131, 0, 0, 0, 0, 0, 0, 0
5050 DATA 0, 0, 0, 0, 28, 54, 99, 99, 99, 54, 28, 24, 56
5051 DATA 24, 24, 24, 24, 24, 60, 62, 99, 3, 62, 96, 96, 99, 127
5052 DATA 62, 99, 3, 30, 3, 3, 99, 62, 6, 14, 30, 54, 102, 127
5053 DATA 6, 6, 127, 99, 96, 126, 3, 3, 99, 62, 62, 99, 96, 126
5054 DATA 99, 99, 99, 62, 127, 99, 6, 12, 24, 24, 24, 24, 62, 99
5055 DATA 99, 62, 99, 99, 99, 62, 62, 99, 99, 63, 3, 3, 99, 62
5056 DATA 1, 3, 7, 15, 31, 63, 127, 255, 254, 252, 248, 240, 224, 192
5057 DATA 128, 0, 255, 127, 63, 31, 15, 7, 3, 1, 128, 192, 224, 240
5058 DATA 248, 252, 254, 255, 0, 0, 7, 7, 14, 14, 28, 28, 0, 0
5059 DATA 14, 31, 27, 51, 51, 126, 0, 0, 63, 63, 51, 3, 6, 12
5060 DATA 0, 0, 51, 51, 51, 99, 102, 126, 56, 56, 112, 112, 254, 254
5061 DATA 0, 0, 126, 102, 198, 204, 204, 204, 0, 0, 24, 48, 96, 204
5062 DATA 252, 252, 0, 0, 62, 12, 204, 216, 248, 112, 0, 0, 0, 0
5063 DATA 252, 126, 24, 24, 12, 12, 0, 0, 120, 252, 204, 204, 204, 102
5064 DATA 0, 0, 248, 252, 204, 204, 204, 102, 0, 0, 124, 254, 198, 192
5065 DATA 96, 60, 0, 0, 124, 254, 198, 198, 96, 56, 12, 6, 6, 99
5066 DATA 127, 62, 0, 0, 51, 51, 51, 63, 63, 30, 0, 0, 102, 102
5067 DATA 51, 51, 51, 51, 0, 0, 56, 96, 99, 99, 63, 30, 0, 0
5068 DATA 12, 6, 99, 99, 127, 62, 0, 0, 0, 0, 0, 0, 0, 0
5069 DATA 0, 0, 0, 0, 24, 0, 0, 252, 0, 0, 24, 0, 0, 24
5070 DATA 0, 0, 0, 0, 0, 60, 0, 0, 126, 0, 0, 126, 0, 0
5071 DATA 126, 0, 0, 126, 0, 0, 0, 0, 24, 0, 0, 16, 0
5072 DATA 0, 0, 0, 0, 0, 0, 1, 129, 128, 7, 135, 128, 0, 0
5073 DATA 0, 0, 63, 127, 224, 199, 207, 207, 207, 207, 252, 254, 7, 227
5074 DATA 243, 243, 243, 243, 207, 207, 207, 207, 199, 224, 127, 63, 243, 243
5075 DATA 243, 243, 227, 7, 254, 252, 255, 255, 0, 255, 255, 255, 255, 255
5076 DATA 255, 255, 255, 255, 255, 0, 255, 255, 255, 87, 255, 146, 201, 226
5077 DATA 241, 255, 255, 239, 255, 87, 35, 73, 37, 255, 192, 0, 0, 192
5078 DATA 0, 0, 224, 0, 0, 224, 0, 0, 212, 0, 0, 224, 0, 0
5079 DATA 224, 0, 0, 192, 0, 0, 192, 0, 0, 0, 0, 0, 0, 0
5080 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5081 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5082 DATA 0, 0, 0, 0, 0, 4, 0, 0, 4, 0, 0, 38, 0, 0, 255
5083 DATA 192, 0, 255, 192, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5084 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5085 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5086 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
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Continued overleaf

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5087 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5088 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5089 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
5090 DATA 0, 0, 0, 0, 16, 16, 16, 16, 16, 16, 16, 16, 0, 0
5091 DATA 0, 255, 0, 0, 0, 0, 0, 0, 0, 240, 16, 16, 16, 16
5092 DATA 0, 0, 0, 31, 16, 16, 16, 16, 16, 16, 16, 16, 240, 0, 0
5093 DATA 0, 0, 16, 16, 16, 31, 0, 0, 0, 0, 0, 0, 102, 60, 255
5094 DATA 60, 102, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 255, 129
5095 DATA 129, 129, 129, 129, 129, 255, 255, 195, 165, 153, 153, 165, 195, 255
5096 DATA 172, 199, 48, 162, 7, 202, 189, 192, 48, 232, 157, 192, 48, 202
5097 DATA 208, 245, 140, 192, 48, 96, 172, 192, 48, 162, 0, 232, 189, 192
5098 DATA 48, 202, 157, 192, 48, 232, 224, 7, 208, 243, 140, 199, 48, 96
5099 DATA 162, 7, 189, 192, 48, 42, 189, 192, 48, 42, 157, 192, 48, 202
5100 DATA 16, 242, 96, 162, 7, 189, 192, 48, 106, 189, 192, 48, 106, 157
5101 DATA 192, 48, 202, 16, 242, 96, 147, 151, 81, 64, 64, 64, 64, 64
5102 DATA 64, 64, 64, 64, 64, 64, 64, 64, 64, 64, 64, 64, 64, 64
5103 DATA 64, 61, 141, 64, 81, 64, 64, 64, 64, 64, 64, 64, 64, 64
5104 DATA 64, 64, 64, 64, 64, 64, 64, 64, 64, 64, 64, 61, 141, 64
5105 DATA 64, 154, 216, 220, 220, 220, 220, 220, 220, 220, 220, 220, 220, 220
5106 DATA 220, 220, 220, 220, 220, 220, 220, 220, 220, 217, 141, 151, 64, 64
5107 DATA 154, 94, 31, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88
5108 DATA 88, 88, 88, 88, 88, 88, 88, 88, 88, 154, 95, 141, 151, 64
5109 DATA 64, 154, 94, 31, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88
5110 DATA 88, 88, 88, 88, 88, 88, 88, 88, 88, 154, 95, 32, 32
5111 DATA 32, 32, 129, 84, 72, 69, 32, 5, 49, 57, 84, 72, 141, 151
5112 DATA 64, 64, 154, 94, 31, 88, 88, 88, 88, 88, 88, 88, 88, 88
5113 DATA 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 154, 95, 141
5114 DATA 151, 64, 64, 154, 94, 31, 88, 88, 88, 88, 88, 88, 88, 88
5115 DATA 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 154, 95
5116 DATA 32, 32, 32, 32, 32, 129, 83, 67, 82, 69, 69, 78, 141, 151
5117 DATA 64, 64, 154, 94, 31, 88, 88, 88, 88, 88, 88, 88, 88, 88
5118 DATA 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 154, 95, 141
5119 DATA 151, 64, 64, 154, 94, 31, 88, 88, 88, 88, 88, 88, 88, 88
5120 DATA 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 154, 95
5121 DATA 141, 151, 64, 64, 154, 94, 31, 88, 88, 88, 88, 88, 88, 88
5122 DATA 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 154
5123 DATA 95, 141, 151, 64, 64, 154, 94, 31, 88, 88, 88, 88, 88, 88
5124 DATA 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88
5125 DATA 154, 95, 32, 32, 32, 32, 32, 32, 32, 154, 62, 63, 192, 193, 141
5126 DATA 151, 64, 64, 154, 94, 31, 88, 88, 88, 88, 88, 88, 88, 88
5127 DATA 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 154, 95
5128 DATA 32, 32, 32, 32, 32, 32, 158, 194, 195, 196, 197, 141, 151, 64
5129 DATA 64, 154, 94, 31, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88
5130 DATA 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 154, 95, 32, 32
5131 DATA 32, 32, 32, 32, 154, 198, 199, 200, 201, 202, 141, 151, 64, 64
5132 DATA 154, 94, 31, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88
5133 DATA 88, 88, 88, 88, 88, 88, 88, 88, 88, 154, 95, 32, 32, 32
5134 DATA 32, 32, 32, 158, 203, 204, 205, 206, 207, 141, 151, 64, 64, 154
5135 DATA 94, 31, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88, 88
5136 DATA 88, 88, 88, 88, 88, 88, 88, 88, 88, 154, 95, 141, 151, 60, 64
5137 DATA 154, 94, 221, 221, 221, 221, 221, 221, 221, 221, 221, 221, 221, 221
5138 DATA 221, 221, 221, 221, 221, 221, 221, 221, 95, 141, 32, 151, 60, 154
5139 DATA 94, 158, 83, 67, 79, 82, 69, 154, 221, 5, 48, 48, 48, 154
5140 DATA 221, 221, 221, 158, 84, 73, 77, 69, 154, 221, 5, 48, 48, 48
5141 DATA 154, 95, 141, 32, 32, 154, 218, 221, 221, 221, 221, 221, 221, 221
5142 DATA 221, 221, 221, 221, 221, 221, 221, 221, 221, 221, 221, 221, 221, 219
5143 DATA 141, 17, 17, 17, 29, 29, 29, 29, 29, 29, 29, 29, 29, 29
5144 DATA 29, 29, 29, 155, 60, 255, 223, 61, 17, 157, 35, 157, 157, 28
5145 DATA 36, 145, 145, 29, 29, 29, 29, 29, 29, 29, 29, 29, 29, 29
5146 DATA 29, 29, 29, 29, 30, 37, 38, 39, 17, 157, 157, 157, 28, 91
5147 DATA 92, 93, 17, 157, 157, 157, 94, 33, 95, 17, 157, 157, 157, 94
5148 DATA 64, 95, 17, 157, 157, 157, 151, 60, 64, 64, 61, 19, 169, 3
5149 DATA 141, 60, 3, 169, 0, 141, 79, 3, 169, 116, 141, 62, 3, 141
5150 DATA 3, 208, 169, 48, 141, 2, 208, 169, 204, 141, 249, 7, 169, 128
5151 DATA 141, 63, 3, 141, 4, 208, 169, 165, 141, 5, 208, 169, 205, 141
5152 DATA 250, 7, 169, 190, 141, 64, 3, 169, 5, 141, 72, 3, 169, 0
5153 DATA 141, 61, 3, 174, 60, 3, 232, 224, 11, 208, 2, 162, 2, 142
5154 DATA 60, 3, 142, 39, 208, 173, 64, 3, 141, 248, 7, 32, 151, 224
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5155 DATA 165, 142, 201, 126, 176, 247, 24, 105, 54, 141, 65, 3, 141, 0
5156 DATA 208, 32, 151, 224, 165, 142, 201, 70, 176, 247, 24, 105, 80, 141
5157 DATA 66, 3, 141, 1, 208, 169, 1, 141, 67, 3, 165, 141, 41, 1
5158 DATA 240, 5, 169, 255, 141, 67, 3, 169, 1, 141, 68, 3, 32, 151
5159 DATA 224, 165, 141, 41, 1, 240, 5, 169, 255, 141, 68, 3, 169, 0
5160 DATA 141, 78, 3, 169, 10, 141, 73, 3, 169, 0, 141, 69, 3, 141
5161 DATA 70, 3, 173, 0, 220, 74, 176, 5, 162, 255, 142, 69, 3, 74
5162 DATA 176, 5, 162, 1, 142, 69, 3, 74, 176, 5, 162, 255, 142, 70
5163 DATA 3, 74, 176, 5, 162, 1, 142, 70, 3, 173, 69, 3, 201, 1
5164 DATA 208, 13, 173, 62, 3, 201, 161, 240, 6, 238, 62, 3, 32, 0
5165 DATA 52, 173, 69, 3, 201, 255, 208, 13, 173, 62, 3, 201, 74, 240
5166 DATA 6, 206, 62, 3, 32, 20, 52, 173, 70, 3, 201, 255, 208, 13
5167 DATA 173, 63, 3, 201, 48, 240, 6, 206, 63, 3, 32, 42, 52, 173
5168 DATA 70, 3, 201, 1, 208, 13, 173, 63, 3, 201, 198, 240, 6, 238
5169 DATA 63, 3, 32, 59, 52, 173, 62, 3, 141, 3, 208, 173, 63, 3
5170 DATA 141, 4, 208, 173, 0, 220, 41, 16, 208, 16, 173, 78, 3, 208
5171 DATA 16, 169, 1, 141, 78, 3, 32, 219, 56, 24, 144, 5, 169, 0
5172 DATA 141, 78, 3, 173, 79, 3, 240, 3, 76, 233, 54, 206, 72, 3
5173 DATA 208, 49, 169, 5, 141, 72, 3, 174, 61, 3, 232, 224, 5, 208
5174 DATA 5, 169, 11, 141, 39, 208, 224, 10, 208, 8, 162, 0, 173, 60
5175 DATA 3, 141, 39, 208, 142, 61, 3, 174, 64, 3, 232, 224, 192, 208
5176 DATA 2, 162, 187, 142, 64, 3, 142, 248, 7, 32, 151, 224, 165, 142
5177 DATA 201, 8, 176, 9, 169, 0, 56, 237, 67, 3, 141, 67, 3, 32
5178 DATA 151, 224, 165, 142, 201, 8, 176, 9, 169, 0, 56, 237, 68, 3
5179 DATA 141, 68, 3, 173, 65, 3, 24, 109, 67, 3, 201, 49, 240, 7
5180 DATA 201, 183, 240, 3, 141, 65, 3, 173, 66, 3, 24, 109, 68, 3
5181 DATA 201, 75, 240, 7, 201, 153, 240, 3, 141, 66, 3, 173, 65, 3
5182 DATA 141, 0, 208, 173, 66, 3, 141, 1, 208, 32, 94, 57, 206, 73
5183 DATA 3, 208, 8, 169, 10, 141, 73, 3, 32, 162, 57, 173, 76, 3
5184 DATA 208, 6, 173, 77, 3, 208, 1, 96, 76, 136, 55, 169, 2, 141
5185 DATA 33, 208, 174, 0, 208, 160, 20, 236, 63, 3, 240, 6, 232, 136
5186 DATA 16, 247, 48, 81, 174, 1, 208, 160, 20, 236, 62, 3, 240, 6
5187 DATA 232, 136, 16, 247, 48, 65, 32, 111, 57, 169, 1, 141, 79, 3
5188 DATA 169, 0, 141, 33, 208, 169, 11, 141, 5, 212, 160, 160, 173, 5
5189 DATA 208, 205, 1, 208, 240, 3, 206, 5, 208, 173, 2, 208, 205, 0
5190 DATA 208, 240, 3, 238, 2, 208, 140, 1, 212, 169, 128, 141, 4, 212
5191 DATA 169, 129, 141, 4, 212, 162, 0, 202, 208, 253, 136, 208, 213, 240
5192 DATA 5, 169, 8, 141, 5, 212, 169, 4, 141, 1, 212, 169, 32, 141
5193 DATA 4, 212, 169, 33, 141, 4, 212, 32, 94, 57, 169, 0, 141, 33
5194 DATA 208, 96, 169, 6, 133, 250, 169, 0, 133, 251, 198, 251, 208, 252
5195 DATA 198, 250, 208, 244, 96, 248, 173, 74, 3, 24, 105, 1, 141, 74
5196 DATA 3, 173, 75, 3, 105, 0, 141, 75, 3, 216, 41, 15, 24, 105
5197 DATA 48, 141, 137, 6, 173, 74, 3, 168, 74, 74, 74, 74, 24, 105
5198 DATA 48, 141, 138, 6, 152, 41, 15, 24, 105, 48, 141, 139, 6, 96
5199 DATA 248, 173, 76, 3, 56, 233, 1, 141, 76, 3, 173, 77, 3, 233
5200 DATA 0, 141, 77, 3, 216, 41, 15, 24, 105, 48, 141, 148, 6, 173
5201 DATA 76, 3, 168, 74, 74, 74, 74, 24, 105, 48, 141, 149, 6, 152
5202 DATA 41, 15, 24, 105, 48, 141, 150, 6, 96
5203 REM BET YOU'RE GLAD!
```

Program 2

```
 0 REM ***** PROG2 *****
 1 POKE52,46:POKE56,46:CLR:PRINTCHR$(8):POKE53272,29
 2 POKE53280,0:POKE53281,0:POKE53269,0
 3 GOSUB2000
 4 HI=0:POKE53276,7:POKE53277,0:POKE53271,0:POKE53275,0:POKE53264,0
 5 POKE54296,15:FORR=54272TO54295:POKER,0:NEXT
 6 GOSUB1000
 7 FORR=53248TO53263:POKER,0:NEXT
 10 POKE53285,15:POKE53286,2
 20 GOSUB500
 22 POKE53269,31:POKE2043,197:POKE2044,202
 23 POKE53255,220:POKE53257,220
 24 POKE53290,9:POKE53291,10
 25 POKE54277,12:POKE54276,128:POKE54276,129
```

Continued overleaf

```
26 FORR=254TO138STEP-2
27 POKE54273,255-R:POKE53254,R:POKE53256,R:NEXT
48 POKE53288,1:POKE53289,1
90 SC=0:POKE842,0:POKE843,0:REM SCORE
92 POKE844,153:POKE845,9:REM TIME
100 SYS14052
110 SC=(PEEK(1673)-48)*100+(PEEK(1674)-48)*10+PEEK(1675)-48
115 POKE53269,0
120 PRINTCHR$(147)SPC(210)"YOUR SCORE WAS"SC
122 PRINTSPC(90)"THE HI SCORE IS"HI
124 IFHI<SCTHENPRINTSPC(124)"YOU HAVE THE NEW HI SCORE OF"SC:HI=SC
125 FORT=0TO1999:NEXT
130 PRINTSPC(169)"PRESS SPACE TO REPLAY"
140 GETA$:IFA$<>" "THEN140
150 GOTO5
500 FORR=13388TO14051
502 PRINTCHR$(PEEK(R));
504 NEXT
510 RETURN
1000 PRINTCHR$(147)SPC(208)"WELCOME TO THE WORLD OF"
1010 PRINTSPC(134)"LAZY  JONES"
1020 PRINTSPC(170)"BY DAVID WHITTAKER"
1030 PRINTSPC(251)"JOYSTICK  PORT 2"
1040 POKE54277,13:POKE54284,13:POKE54291,13
1042 POKE54273,4:POKE54280,4:POKE54287,4:POKE54272,0:POKE54279,8:POKE54286,16
1044 POKE54276,32:POKE54283,32:POKE54290,32
1046 POKE54276,33:POKE54283,33:POKE54290,33
1050 FORT=0TO3999:NEXT
1060 RETURN
2000 FORR=32768TO32804:READD:POKER,D:NEXT:SYS32768:RETURN
2001 DATA169,192,133,250,133,252,169,78,133,251,169,46,133,253,160,0,177,250
2002 DATA145,252,230,250,230,252,208,246,230,251,230,253,165,253,201,58,208,236
2003 DATA96
```


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PROGRAMMING

Make sense of sorting methods

N. Gregory deals with 64 data sorting problems.

IF YOU HAVE ever wanted to program your 64 to sort data, alphabetically or numerically, but haven't been too sure how to go about it, I hope this article will be of some help. The program, SORT DEMO, is a menu driven demonstration of three different sorting routines which will sort the data you have entered, giving at the end of the sort the time the routine took to execute. This time should be used as a guide only, and not as a law, because it does not take into account the time taken for the program to find line numbers, and as the routines are one on top of the other this may be significant.

SORT DEMO is not a very useful program on its own; it wasn't written to be. I am using SORT DEMO to illustrate the routines, and a couple of other things like using the FUNCTION keys, instead of just giving the routines in isolation.

Any program which sorts data must first be given that data. How you go about this depends on your program; you can use DATA statements as this program does, user input via INPUT, or read the data of a disk or tape file. Whichever method you opt for, you should know two things. Firstly you should have some idea how many pieces of data you are going to collect so that you can DIMension the array which will hold your data. The second thing is to count your data as it is entered, so that at the end of the input you know exactly how much data is in the array. Do not assume that there are ten pieces of DATA for example. Once you have counted the number of elements used, it is a good idea to keep this information safe. I would suggest that you store the value in the first element of the array, that is element ZERO.

By doing this you will always know where the information is, and it can be stored on tape or disk as part of the array. All you need to do when reading the array back is use lines such as

```
40 INPUT# 2, TEMP$
50 NUMBER = VAL(TEMP$)
60 DIM ARRAY$(NUMBER):
ARRAY$(0) = TEMP$
70 FOR INDEX = 1 TO NUMBER
80 INPUT# 2, ARRAY$(INDEX)
90 NEXT INDEX
```

Using this technique you can use the data in other programs without having to worry about how much data is in the file.

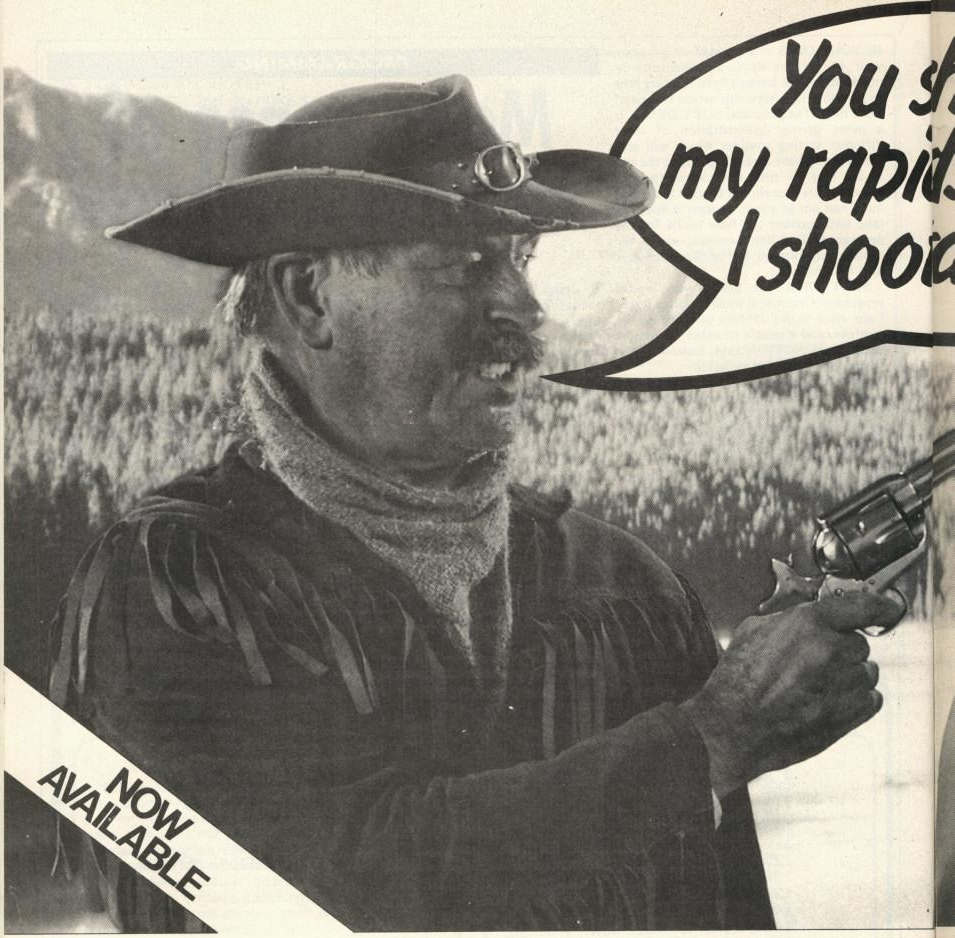
To show you how you can sort arrays, type in SORT DEMO. One thing you must do is add a few more DATA statements otherwise the program will not work properly. To do this all you have to do is type in line one as it is listed, followed by lines two and three. Once you have entered line 3 (and pressed RETURN) go back over the line number and change it to a 4, then a 5 and so on. Remember to press RETURN for each line. I suggest you enter at least 20 more lines because you will then get a good idea of the speed of each routine. When you have done this change the variable in line 110, NMAX, to equal the number of data statements you have, not counting line 1. You can now continue typing in the program, when you've finished SAVE it before you RUN it.

When run, SORT DEMO first asks you to input words to be sorted. These should be a maximum of 14 characters long, and the list finished with the END of DATA character ( ). The limit on word length is not imposed by the sorting routines themselves, but by the DATA statements at the beginning of the program. Because each line has 16 commas in it (you typed them in, so I hope they have!) this leaves enough room for a 14 character word and two inverted commas (''). The only reason for this was that I didn't want you to type the word list in every time you used the program.

After you have finished entering the words you are asked to reSAVE the program. Again this is only to stop you

```
1 DATA"0":REM DATA FLAG
2 DATA,,,,,,,,,,,,,,,,:REM 16 COMMAS
3 DATA,,,,,,,,,,,,,,,,
4 REM  ADD MORE DATA STATEMENTS FROM HERE (SAME AS LINE 2 & 3)
100 :
110 NMAX=2:REM SET NMAX TO NUMBER OF DATA STATEMENTS
115 POKE53280,15:POKE53281,15
120 PRINTCHR$(14):REM LOWER CASE CHARACTERS
125 DIM S0RT$(NMAX),HOLD$(NMAX,2),INDEX(NMAX):REM RESERVE MEMORY
130 GOSUB 920:REM  BUILD CURSOR POSITION ARRAYS
135 READ FLAG$:REM DATA FLAG
140 IF VAL(FLAG$)<1THEN GOSUB 800
145 PRINT"J":REM CLR
150 GOSUB 700:REM  READ DATA STATEMENTS
155 GOSUB 740:REM   MENU TEXT
160 GET ANSWER$:ANSWER$=ANSWER$+CHR$(0)
165 IF ASC(ANSWER$)=94 THEN END
170 ON ABS(ASC(ANSWER$)-132) GOSUB 700,185,270,440
175 GOTO 160
180 REM ------  BUBBLE SORT --------
185 TYPE$="|UBBLE"
190 PRINT:PRINTTAB(12)"♥ ┌ ─ | ↘ ╱ |":REM "SORTING"
195 TI$="000000":REM SET INTERNAL CLOCK
200 INDEX=1:FLAG=0
205 IF S0RT$(INDEX)<=S0RT$(INDEX+1) THEN 230
210 TEMP$=S0RT$(INDEX)
215 S0RT$(INDEX)=S0RT$(INDEX+1)
220 S0RT$(INDEX+1)=TEMP$
225 FLAG=1
230 INDEX=INDEX+1
```

Continued on page 28



CLIFF HANGER

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```
235 IF INDEX<COUNT THEN 205
240 IF FLAG=1 THEN 200
245 TK=TI/60:REM GET TIME OF SORT
250 GOSUB 585:REM  SHOW SORTED ARRAY
255 GOSUB 740:REM  MENU TEXT
260 RETURN
265 REM ----- SHELL METZNER SORT ------
270 TYPE$="■HELL ↖ETZNER"
275 REM   "[REV]P[REV OFF]OINTER OR [REV]C[REV OFF]ONTENTS"
280 PO%=0:HT=8:VT=20:GOSUB915:PRINT"■■OINTER OR ■■ONTENTS ";:INPUTAN$
285 IFASC(AN$)=80 THEN PO%=1:FORI=1 TO COUNT:INDEX(I)=I:NEXT
290 IFASC(AN$)<>80 AND ASC(AN$)<>67 THEN 280
295 PRINT:PRINTTAB(12)"■ ┌ ─ │ ↘ ↗ │"
300 TI$="000000":REM SET INTERNAL CLOCK
305 RANGE=COUNT
310 RANGE=INT(RANGE/2):IF RANGE=0 THEN 385
315 INDEX=1
320 FLAG=COUNT-RANGE
325 LELEMENT=INDEX
330 UELEMENT=LELEMENT+RANGE
335 IF PO%=1 THEN GOSUB 410:ON PP% GOTO370,360
340 IF S0RT$(LELEMENT)<=S0RT$(UELEMENT) THEN 370
345 TEMP$=S0RT$(LELEMENT)
350 S0RT$(LELEMENT)=S0RT$(UELEMENT)
355 S0RT$(UELEMENT)=TEMP$
360 LELEMENT=LELEMENT-RANGE
365 IF LELEMENT>1 THEN 330
370 INDEX=INDEX+1
375 IF INDEX > FLAG THEN 310
380 GOTO325
385 TK=TI/60:REM GET TIME OF SORT
390 GOSUB 585:REM  SHOW SORTED ARRAY
395 GOSUB 740:REM  MENU TEXT
400 RETURN
405 REM ----  POINTER  ONLY -------
410 IF S0RT$(INDEX(LELEMENT))<=S0RT$(INDEX(UELEMENT)) THEN PP%=1:GOTO 430
415 TEMP=INDEX(LELEMENT)
420 INDEX(LELEMENT)=INDEX(UELEMENT)
425 INDEX(UELEMENT)=TEMP:PP%=2
430 RETURN
435 REM ----- SHUFFLE SORT --------
440 TYPE$="SHUFFLE"
445 PRINT:PRINTTAB(12)"■ ┌ ─ │ ↘ ↗ │"
450 TI$="000000":REM SET INTERNAL CLOCK
455 FOR INDEX=1 TO COUNT:HOLD$(INDEX,0)=CHR$(1):HOLD$(INDEX,1)=CHR$(1):NEXT
460 HOLD$(1,0)=S0RT$(1):F=0:N(0)=1:N(1)=0
465 FOR INDEX=2 TO COUNT
470 IF S0RT$(INDEX)<S0RT$(INDEX-1)THEN F=(F+1)AND1
475 N(F)=N(F)+1
480 HOLD$(N(F),F)=S0RT$(INDEX)
485 NEXT INDEX
490 IF ASC(HOLD$(1,1))<33 THEN 560
495 S0RT$(0)=CHR$(1):H%=0:H0=1:H1=1
500 FOR INDEX = 1 TO COUNT
505 TEMP$=S0RT$(INDEX-1)
510 IF ASC(HOLD$(H1,1))< 33THEN H%=2:GOTO 540
515 IF ASC(HOLD$(H0,0))<33 THEN H%=1:GOTO 545
520 IF HOLD$(H1,1)=>TEMP$ THEN H%=1
525 IF HOLD$(H0,0)=>TEMP$ THEN H%=H%+2
530 IF H%=0 THEN H%=3
535 IF H%=3 THEN H%=2:IF HOLD$(H0,0)>HOLD$(H1,1) THEN H%=1
540 IF H%=2 THEN S0RT$(INDEX)=HOLD$(H0,0):H0=H0+1
545 IF H%=1 THEN S0RT$(INDEX)=HOLD$(H1,1):H1=H1+1
550 H%=0:NEXT INDEX
555 GOTO455
560 TK=TI/60:REM GET TIME OF SORT
565 GOSUB 585:REM  SHOW SORTED ARRAY
570 GOSUB 740:REM  MENU TEXT
575 RETURN
580 REM ------ DISPLAY ARRAY --------
```

```
585 PRINT"■":GC=0:GOSUB 685:REM  SET UP PAGE:REM [CLR]
590 FOR G=1 TO COUNT:GC=GC+1
595 IF GC=20 THEN GOSUB 685
600 IF GC>19 THEN PRINT,,S0RT$(G)
605 IF GC<20 THEN PRINTTAB(2)S0RT$(G)
610 IF GC=38 THEN GOSUB 655
615 NEXT G
620 GOSUB 625:GOSUB 655:RETURN
625 HT=8:VT=23:GOSUB915:PRINT"TIME :";
630 IF TK<60 THEN PRINTINT(TK+.5);"SECS.":RETURN
635 TM=INT(TK/60):TS=INT(TK-TM*60+.5):REM TM=MINS;TS=SECS (ROUNDED UP)
640 PRINT TM;"MINS.";TS;"SECS.":RETURN
645 GOSUB655:GOSUB740:RETURN
650 :
655 HT=6:VTAB=24:GOSUB915:PRINT"■  PRESS ♥↑♠←  ↑♠_ TO CONTINUE  "
660 REM PRINT"[REV] PRESS SPACE BAR TO CONTINUE "
665 POKE198,0:WAIT 198,1:POKE198,0:REM WAIT FOR KEY PRESS
670 PRINT"■":GOSUB685:REM [CLR]
675 GC=0:RETURN
680 :
685 PRINT"■■  ♥ORTED ♠RRAY USING ";TYPE$;" SORT."
690 PRINT:RETURN
695 :
700 HT=8:VT=20:GOSUB 915:PRINT"***  _EADING DATA  ***"
705 RESTORE
710 READA$:COUNT=0
715 READA$:IF A$=""THEN 715
720 IFASC(A$)=94 THEN GOSUB 915:PRINT"                                ":RETURN
725 COUNT=COUNT+1:S0RT$(COUNT)=A$
730 GOTO 715
735 REM -------- MENU --------
740 PRINT"■■■";SPC(10);"■┌──────────────────────┐":REM "[CLR][CUD][CUD]"
745 PRINTTAB(10)"│■ ♥ORT DEMO ROGRAM ■│"
750 PRINTTAB(10)"└──────────────────────┘"
755 PRINT"■■■■";SPC(3)" OU HAVE GOT";COUNT;"ELEMENTS IN THE":REM "[CUD]X3
760 PRINTTAB(3)"ARRAY";CHR$(34);"♥0_!$";CHR$(34);"."
765 PRINT:PRINTTAB(3)" SING THE _↗←!↖┌↙↗ ↑ I♥ YOU CAN;"
770 PRINT:PRINTTAB(2)"_E_EAD DATA INTO ♥0_!$.....F1."
775 PRINTTAB(2)"ERFORM A UBBLE SORT.....F3."
780 PRINTTAB(2)"ERFORM A ♥HELL ↖ETZNER SORT....F5."
785 PRINTTAB(2)"ERFORM A ♥HUFFLE SORT.....F7."
790 PRINT:PRINTTAB(2)"┌_ PRESS ";CHR$(34);"↑";CHR$(34);" TO ND."
795 RETURN
800 :
805 N=0:REM ENTRY COUNTER
810 ADRS=2049:REM START OF BASIC+1
815 DEF FN DEEK(ADRS)=PEEK(ADRS)+PEEK(ADRS+1)*256
820 PRINT"■NTRIES MUST BE ♥ THAN 15 CHARACTERS ";
825 PRINTSPC(10)" ↑ TO ♥TOP INPUT "
830 N=N+1:IFN=NMAX THEN ENTRY$="↑":GOTO 845:REM SET ENTRY$ TO LEAVE ROUTINE
835 PRINT"■■■■NTRY NUMBER";N;"    ";:REM [CUD][CUR][CUR][CUR]
840 INPUT ENTRY$
845 LE=LEN(ENTRY$):IFLE<1 OR LE>14THEN835:REM CHECK LENGTH
850 NXT=FNDEEK(ADRS):REM NEXT LINE ADDRESS
855 ADRS=NXT:NXT=FN DEEK(ADRS):REM JUMP OVER LINE:N.B. JUMP OVER LINE 5
860 ADRS=ADRS+5:REM MOVE TO POINT TO FIRST COMMA IN DATA STATEMENT
865 IFPEEK(ADRS)<>44THENADRS=ADRS-3:PRINT"PROGRAMMING ERROR IN LINE";FNDEEK(ADRS
):END
870 POKE ADRS,34:REM FIRST "
875 FORI=1 TO LE:POKE ADRS+I,ASC(MID$(ENTRY$,I,1)):NEXT
880 POKE ADRS+I,34:REM PUT IN 2ND "
885 IF ASC(ENTRY$)<>94 THEN ADRS=ADRS-5:GOTO 830
890 POKE 2055,49:REM SET DATA FLAG
895 PRINT"■■■■■■■OU MUST NOW RESAVE THE PROGRAM."
900 PRINT:PRINTTAB(3)"_EPLACE THE TAPE IN THE RECORDER":PRINTTAB(3)"AND ";
905 SAVE"SORT DEMO"
910 RETURN
915 PRINTLEFT$(VT$,VT);LEFT$(HT$,HT);:RETURN
920 FORI=1TO24:VT$=VT$+"■":NEXT:VT$="■"+VT$:FORI=1TO39:HT$=HT$+"■":NEXT:RETURN
925 REM VT$=VT$+[CUD]:VT$=[HOME]+VT$:HT$=HT$+[CUR]
```

retyping. One word of warning though; the Commodore only checks to see if a key on the Datasette is being pressed, not the record/play combination. When the program asks you to PRESS RECORD AND PLAY ON TAPE you should press just that — get the tape ready before you enter the END of DATA character.

After SAVEing the revised program, SORT DEMO will present you with the menu, from which you can do one of five things. There are three sort routines, BUBBLE SORT, SHELL METZNER SORT and SHUFFLE SORT, the facility to reREAD the data into the sorting array, and END. You should reREAD the data after each sort otherwise you will find the BUBBLE SORT sorting data in less than a second, something that does not happen in the real world!

Of the three routines I have chosen the BUBBLE sort is the slowest and simplest. I have included it because it is the best routine for translation into machine code if any of you are brave enough.

The two other routines are a little involved but you shouldnt have too much problem working out their logic. The SHELL METZNER sort I have divided into two sections to illustrate another method you may need to sort arrays. Let us suppose you want to sort data in an Address Book type of program. In a program such as this, the chances are that all the data will be linked, that is the names will go with the addresses. Obviously if you just sort the Name file, the Address file may lose all connection so in the end you are left with an unrelated mass of data.

Pointers

You can get round this problem by not sorting the array contents themselves, but sort a set of pointers to the array contents. In this way the contents of the array do not change order and if, for example NAME$(5) was SMITH. and ADDRESS$(5) was PARADISE ST. then even after sorting the contents of NAME$(5) and ADDRESS$(5) would be the same as they were originally. The modification in the SHELL METZNER sort does this. It leaves the contents of the sorting array alone and sorts pointers which it holds in the array INDEX(). To illustrate this, run the SHELL METZNER sort but answer "P" when asked if you want to sort Contents or Pointer (normally answer "C"). Let the sort run until the list giving the sorted array comes on the screen. Note that the list is not sorted but is in the order that it was READ from the DATA statements. Now stop the program, press RUN/STOP, and type

```
FOR N=1 TO COUNT: PRINT
SORT$(INDEX(N)): NEXT N
```

you will now see a sorted list being printed. If you want to slow the list down just press the CTRL key.

This method brings me on to an aspect of computing which is outside the scope of this article, that of Garbage Collection. Garbage Collection is one of those things which is going to happen to you sooner or later — rather like a disk crash. You will get garbage problems if you move a lot of STRING data about; garbage is after all just another way of saying used strings. Unfortunately there are few programs better at moving strings and creating garbage, than sorting programs. You may have not come across this problem yet, probably because the Commodore's memory is so enormous, but if your program has siezed up for no apparent reason than that's probably garbage collection going on.

One of the best ways to avoid the time delay in garbage collection is not to use STRING movements at all which, if you remember is what the modification to the SHELL METZNER does. It shifts variables, which are a totally different thing altogether.

If you do find you are having Garbage problems with a program you are writing, then try one of these remedies (you won't get these problems with SORT DEMO normally)

i) Try to use index sorting, as demonstrated.

ii) Null all the strings you don't need and force a garbage collection with the statement GARBAGE=FRE(0)

iii) Save all your data and then do a CLR. This may be a bit drastic but sometime garbage can take 20 minutes so it may be worth it.

The two things SORT DEMO doesn't illustrate are

i) How to limit the sort to a specified number of characters — the sort KEY.

ii) How to sort numeric data.

Both of these problems are easily got round. The first can be solved by using the String chopping commands of BASIC and replacing any comparative statements, for instance

```
IF SORT$(INDEX) <= SORT$
(INDEX+1) THEN 300
```

by commands such as

```
IF LEFT$(SORT$(INDEX),KEY) <=
LEFT$(SORT$(INDEX=1),KEY) THEN
300
```

where KEY is the number of characters you want to consider in the sort.

Sorting

Sorting numbers can be done by putting the VAL function into the string expression but, as I have mentioned, strings can cause garbage collection problems. If you know your list of data is going to be numbers, then write your routine to handle numbers. It's the same as the routines for Strings but use floating point or integer arrays, not string arrays.

Finally, because I wanted you to dissect the SORT DEMO program so that you can use the routines in it for your own programs here is a list of the variables and, briefly, what they do. ■

List of variables

SORT$(: Holds the data to be sorted.
TYPE$: This is the type of sort routine being used, this variable is used to name the sort when the array is displayed.
TI$: This is the Commodore BASIC command variable to read/write to the jiffy clock.
TEMP$: Used inside routines to hold temporary strings.
COUNT : The number of elements in the array SORT$(
TK : The reading off the jiffy clock divided by 60. This gives the result in seconds not 60'ths of a second.
NMAX : The number of DATA statements hence the number (maximum) pieces of data to go into SORT$
HT & VT: Cursor positioning variables which are linked to the arrays HT$ & VT$ which contain cursor movement characters.

BUBBLE SORT

FLAG : This variable equals one if any strings are moved. Only when all the strings are in order will FLAG stay zero during a pass through the array.
INDEX : This is a count variable here. It is set to the element of the array being considered.

SHELL METZNER SORT.

PO% : This variable equals one if you chose to sort by pointers rather than contents.
PP% : This redirects the routine after a pointer is sorted
INDEX(: This array holds the sorted pointers when you sort by pointers.
RANGE : This is the range over which 2 elements in the array are compared — it gets halved each time through.
FLAG : This variable marks the end of the RANGE.
LELEMENT & UELEMENT : These are the two elements in the array which are being compared.

SHUFFLE SORT

HOLD$(: This array holds two sets of data. The data is SHUFFLED in to this array depending on how it compares with the previous piece of data put in to HOLD$.
F : This variable is used to switch between the 2 elements of HOLD$. The expression F=(F+1) AND 1 makes F go between 0 and 1 each time the expression is encountered.
N(: The 2 elements of this array counts the respective number of entries into each dimension of HOLD$
H% : This is used to tell the routine the result of the comparison between HOLD$ and SORT$. It then directs how the next element of SORT$ is to be filled.
H0 & H1 : These 2 variables keep count of which element in HOLD$ the program has to consider.

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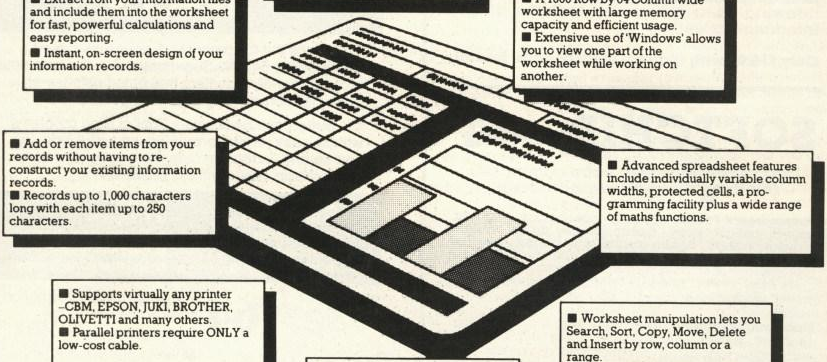

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Is this a dagger I see before me...?

Wicked Witch of the West ***Barbara Conway*** *is inspired by Eureka!, cut up about Macbeth and alienated by Alien*

ADVENTURE junkies are always craving new and varied experiences, but even the most hyperactive of us could hardly complain on this score when it comes to the remarkable **Eureka** package offered by Domark. No less than 10 games, five arcades and five quests, crowd onto one tape and in case the challenge alone isn't enough, there's a £25,000 prize awaiting the first adventurer to solve the lot.

This is a massive quest, ranging from prehistoric to modern times with the aim being to track down the five missing pieces of the Temporal Talisman, an alien artefact without which the moon will disintegrate and take the earth with it. Each piece has ended up in a different time sector and, if you don't solve each puzzle correctly you could be stuck in that era. Since all of them are fraught with murderous pitfalls, that is NOT a good idea. Just to complicate matters, the final section is being held for ransom by the villainous Dr Hugo Von Berg who wants to be Emperor of the Earth. Well, don't we all?

Ingenious

The introductory arcades, which set your vitality level in the adventure to come, are nothing very special and, as a lousy arcade player, I could have done without them. But the quests themselves are a much more attractive prospect.

Each is illustrated with swift, well-drawn graphics windows of varying size and with some scenes animated, such as the attack of an aggressive eagle. The locations include jousting pavilions, Roman galleys, a German prisoner-of-war camp and the Caribbean jet-set, each of which will eventually yield a coded clue for the final adventure. There are some sound effects, good but not spectacular, but the puzzles are ingeniously constructed and the solutions often rely on a sense of humour. You won't figure out how to free Merlin from his rock prison in the Celtic chapter without one!

My arcade inadequacies ensure that I don't have much vigour for fights so the £25,000 is probably safe from me. I suggest that dedicated adventurers who have the same problem get a bright 12 year-old to do the arcade games and then make use of the resultant strength together with their wits to solve the rest.

Onto another multi-faceted game, this time a four-parter. Since **Macbeth** was produced by Oxford Digital Enterprises

with the backing of the publishers of this magazine, I had intended this review to be a monument to my fearless independence. Alas for good intentions! Unfortunately, it turns out to be a veritable peach of an adventure, complex, witty, with stunning graphics and sound effects and some remarkable documentation (author W Shakespeare, a computer game scenario-writer who should go far).

Dunsinane

The games follow the plot of the play closely and the "help" facility gives references to the edited version of the play enclosed with the two tapes, which give useful clues about how to proceed and/or dispose of threats; although thus far I have been able to achieve only minor variations in averting Macbeth's come-uppance.

The games vary from text and graphics, which will change according to whether a trapdoor has been opened or a required object deposited (don't jump when you hear the very realistic sound effects from what you put on the battlements — yuk!) through mainly graphics to real-time text-only for the final confrontation at Dunsinane castle.

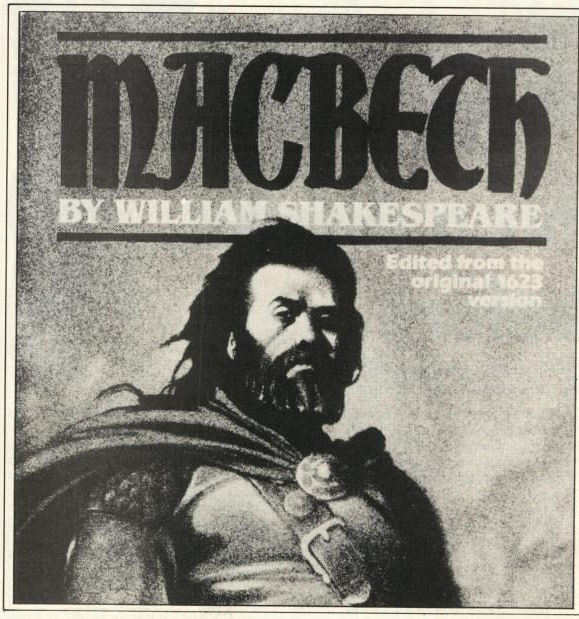
Some of the time the player is Macbeth, in other adventures you will be Lady M facing the tricky domestic chores of fixing up a last-minute banquet, persuading hubby to slaughter your royal guest and finding something a bit more exotic than the odd pinch of salt to add to a boiling cauldron.

After each game you can visit Sigmund, Scotia's top alchemist and a psychiatrist, for a recap which is both entertaining and informative. The fact that this started life as an educational package is obvious, but the final result is an excellent, and tough, adventure game more than capable of holding its own against the commercial competition.

Secret agent

Another four-parter is **The Pettigrew Chronicles**, which is actually two separate adventures, one of them being the previously-issued, and successful, **Pettigrew's Diary**. I didn't see the original game but, having heard very well of it, I had high hopes of this package from Shards Software.

They were not quite realised, although a lot of time and trouble has obviously gone into the programming and lay-out of these games. The first is **Operation Safras** which combines a secret-agent plot with a fantasy quest. In Part One, which features scrolling text on an attractive screen, reaction times often seemed extraordinarily slow, so much so that I tended to lose interest in the puzzle. The second, fantasy, part is notable for some pleasant animated graphics with the text window in the lower half of the screen.▶



The "Diary" adventure is more fun, with a varied and often witty scenario, but again reactions can be VERY slow, and I was disappointed with the scope of the vocabulary throughout.

Biggest disappointment of the month is probably "Alien", which looks very tempting from the documentation but turns out to be a highly unexciting affair. Graphics include deck charts from the doomed ship of the SF film of the same name and, despite promises of great sophistication from individual personality programs for the crew members, of whom you are the commander, playing is repetitious. After about quarter of an hour, I couldn't give a damn whether the crew decided to obey my orders or not and was cheering on the alien as it decimated them.

Maxwell

Just a few words left for "Front Page", a strategy game based on being a newspaper proprietor in a very right-wing state. Seems to me to be reasonably realistic, apart from over-estimating the number of hacks needed to cover stories, with nice weekly graphic representations of how your papers are doing in readership, income and the likelihood of a government crackdown. You're asked to pick a name (I picked "Maxwell", dunno why really) and I'm pleased to say that my dirt-cheap, sensationalist, government-toadying rag is now wiping the floor with the more sensitive competition. Now there's realism for you. ■

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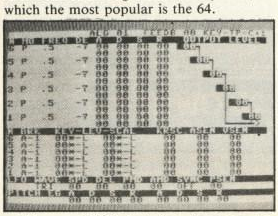
Simple synthesiser software scrutinised

***Chris Whitcombe** plays through JMS/Rosetti's MIDI music software series*

ALTHOUGH MAKING music using the Commodore 64's SID chip can be rewarding in itself, the true potential of computerised music is better realised using the 64 to control a dedicated music synthesiser.

Until recently the only systems able to do this were hugely expensive sequencers manufactured by the synthesiser companies, and because each company used different data transmission standards, it wasn't possible to interface machines from different companies.

The manufacturers recently realised that this situation wasn't in their favour, and came together to develop a standard which would allow musical instruments from different companies to be linked together. This also opens up the possibility of synthesiser control through home computers, of which the most popular is the 64.



Using a MIDI interface between the synthesiser and the 64 enables a new world of musical control through software to be opened up.

The MIDI system has become the new industry standard for interfacing synthesisers, not only with computers, but also with other synthesisers and drum machines. It is now possible, using MIDI, to control large numbers of keyboards and drum machines at the touch of a couple of buttons.

Synthesisers

The system I was shown is by JMS (distributed by Rosetti) and was demonstrated using the Commodore 64 with 1541 Disk Drive. The synthesisers used included a Roland JUNO 106, an OSCar, two Yamaha DX7s (what else) and a Yamaha RX15 Drum machine. The JMS interface plugs into the rear of the 64 and has connections for three synths. Should you be lucky enough to own more than this, don't worry. So long as your keyboards have a THRU socket (most have) they can be daisy-chained in much the same way as Disk drives.

Each instrument is assigned a MIDI channel so that it knows what information to extract and what to pass through to the next connection.

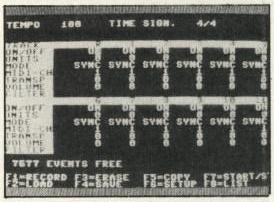
If you should happen to be the proud owner of a DX7 (or DX9 for that matter) you will know that it can be a bit fiddly to program sounds into it, as each parameter has to be adjusted individually using the built-in LCD display. With the JMS SOUND EDITOR program, things are made much simpler, as all the sound parameters are displayed on the screen at the same time. Having created the sound that you want, you can then save it on disk for later retrieval.

Patches

If you don't want to bother making up your own sounds, then you can buy the SOUND LIBRARY disk which contains 192 pre-programmed "patches" for the DX7.

If the Record lights on a tape machine make you nervous, resulting in wrong notes everywhere, then the MULTITRACK COMPOSER program is for you. Instead of recording straight to tape, you play 'into the computer', which stores all the note data in memory. This data can then be displayed and altered via the computer keyboard. You can edit pitch, gate time, velocity and sounds, and you can change the temp without causing a change in the pitch. This means that you can 'cheat' (as if you would) by playing something slowly and then getting the program to replay it at the correct speed.

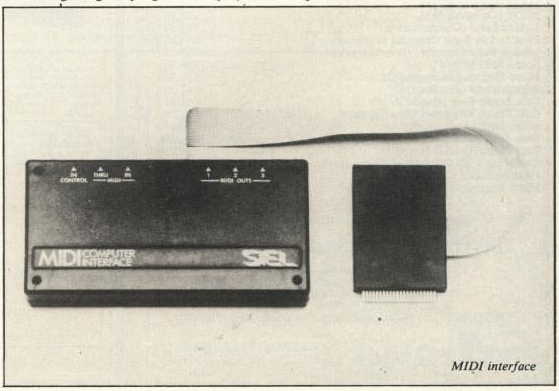
If you own more than one keyboard and you spend a lot of time recording, mixing and dubbing then perhaps the 12 TRACK RECORDING STUDIO program would help to smooth the way. If offers Real Time recording of 12 polyphonic tracks with simultaenous monitoring of all pre-recorded tracks; mixdown of different



tracks into 1 track (and, being digital, there is no loss of sound quality when mixing over and over again); editing, insertion and erasure of sound parameters after recording and loading and storage of compositions on disk. Again, you have temp change without variations of pitch.

Footswitch

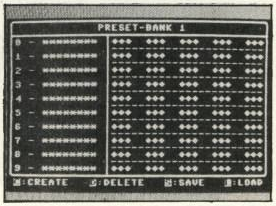
An ARPEGGIATOR program is available which, when used with a footswitch, enables the player to store and arpeggiate up to 40 chords. Arpeggios can be set to run up, down or cycle and sequences can be stored on disk. ▶

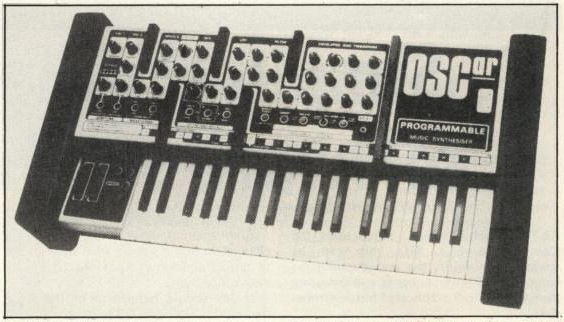


MIDI interface

◀If you are something of a Vangelis or Rick Wakeman, then you will, perhaps, have wished that on some occasions you had ten pairs of hands and half a dozen heads! Not so much to play your array of keyboards, but more to reset them between numbers. Imagine the scene . . . you are on stage in front of an audience of millions. You finish playing one song, but before the next one you have to change the sounds on all the keyboards. Not only do you not have much time, but you also have to remember where you put the scrap of paper with all the presets on! Panic no more; You use the MASTER KEYBOARD program. This little gem will give you fast control of a series of connected keyboards. You simply set up all the sounds in the privacy of your own home in advance, and set them into a designated area on the Master Keyboard. When on stage, all the sound parameters can be sent to all the keyboards at the touch of a button or two. Quite painless.

I was impressed by all the programs (they all worked first time) and, considering their





semi-specialist nature, they are not expensive, costing from about £40 upwards. The interface itself sells for just under £90 which, again, is not a lot considering the avenues that it opens up.

Standard

Now that MIDI has been accepted as the standard, I feel sure that more and more interfaces and programs will become available which will, no doubt, help to drive prices downward. The future of computer-aided synthesis looks very rosy indeed.

I would like to thank George at Gigsounds of Catford for the demonstrations, and Rosetti for showing their wares. If you want to discover more about MIDI, then contact your local synthesiser stockist or try Gigsounds, Rushey Green, Catford, London SE6, tel. 01-690 8621, or Rosetti, 138/140 Old Street, London EC1, tel. 01-253 7294. ■

Commodore Horizons will be looking at all the new music software and hardware as it appears. Forthcoming articles include LVL's Echo 1 keyboard; the Autographics sound sampling system; and products from Seil, Sequential Circuits and Jorath.

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NEW!

Adventures on the magic network

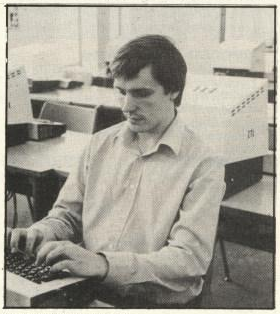
***Richard Bartle** introduces Compunet's Multi-User Dungeon, MUD*

WITH THE increasing popularity of adventure and strategy games as opposed to arcade extravaganzas, one of the most interesting new ideas in the computer world is MUD — the Multi-User Dungeon.

This is a new kind of adventure game where instead of playing alone, you interact in real time with a number of other players. All your actions influence theirs, and vice-versa, so that if you were to, say, walk into a room and find a sword lying on the ground and two other people in the room, the chances are that one of them will pick up the sword before you do — and very likely attack you with it.

Systems like MUD obviously require bigger computing power than any home micro can manage. In fact the original MUD was programmed on a DEC-10 mainframe computer at Essex University.

Commodore's Compunet system uses a similar host computer, so it's no surprise to find that MUD is now available to Compunet users via their Commodore 64's at home.



Richard Bartle, wizard
Below; the Land of MUD

Enthusiastic

This makes it possible for you to play against other Compunet subscribers living hundreds of miles away from you, all through the magic modem.

As we've seen in previous articles, Commodore's Compunet modem comes with one year's subscription to the system for just under £100. Once you've entered the system, MUD can be found using GOTO 106850 and BUY MUD.LINK. Yes, it costs money to play MUD — charges include £5 per month for membership of the closed user group; £3 per hour while playing; plus phone charges. It's not cheap.

However, once you're in you can play in the greatest adventure you've yet seen. I'd be even more enthusiastic in my praise of MUD if I hadn't co-written the game, so I'd better not go too far over the top.

The basic fact is that MUDs are just incredibly more fun to play than ordinary adventures. The maximum number of people able to play on the Essex University system was 12, and you used to have to stay up past midnight to get a game since the Dec-10 was in use during the day. Compunet's MUD can be played at any time of day or night, and with up to 36 simultaneous players.

With all those players, MUD gets pretty hectic. Although the MUD is a text-only adventure, the main attractions are the immense vocabulary, comprehensive descriptive passages and powerful interaction. You have to keep your wits about you all the time — other players can steal your possessions, or set upon you if you look like an easy target.

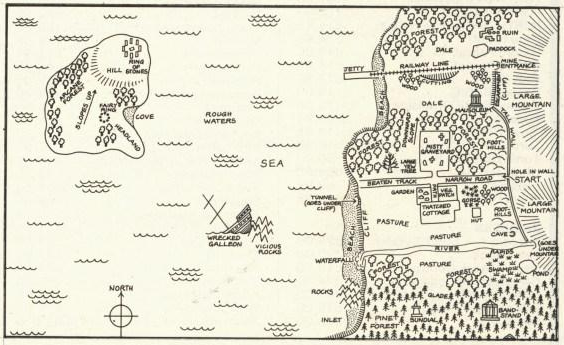
The objective of the game is to collect treasures and hide them in a swamp, thus removing them from the game. Collecting treasures also scores points, and allows you to move up levels. You start as a Novice and finally become a Wizard, endowed with magical powers which enable you to influence the actions of other characters, become invisible and observe the action unnoticed, interfere with the course of the game in various mischevious ways, and reincarnate yourself if you are killed using a special password.

Another feature of MUD is puzzle-solving; if you can figure out how to make the unmade bed, or how to translate the mysterious runes, there are more points to be picked up. It's also possible to play as more than one character; though there are around 40 wizards on the Essex system, many of them also play as lesser characters too.

MUD, of course, isn't the only game available on Compunet; software can be downloaded and run on your own 64. Commodore plans to sell around 10,000 modems in the next three months, and although this figure may be optimistic, business users will probably start showing interest later on, once more services become available to suit their needs. Given the popularity of MUD, though, business users might be well advised not to let their employees spend too much time on the modem!

Century Publications, licensees of MUD, have plans to release a version as a game for stand-alone computers — it could provide a useful "taster" for those of you who want to see the game before deciding to buy a modem.

If you want to find out more about how you can play MUD on the Essex system, contact Richard Bartle, Department of Computer Science, Essex University, Colchester, Essex, CO4 3SQ, enclosing a s.a.e. Contact Compunet at Metford House, Clipstone Street, London W1P 5DF. ■



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COMMODORE SOFTWARE FILE

Cosmic Bugs

This game for the unexpanded Vic comes from Chris Lyon of Liverpool

IN COSMIC BUGS your task is to defend the Earth from invading monsters hovering in the air. The mothership, out of firing range, drops white bugs on your buildings. These are indestructible, so you can only try to kill as many of the yellow bugs as possible before the end comes.

Use A for left, D for right, and L for fire.

There is a short musical sequence, a score table and a high-score record. You get a bonus base for 1000 points.

```
1 REM COSMIC  (C) 1984   FOR
2 REM  BUGS    S.LYON   VIC20
10 V=36878:S1=V-4:S2=V-3:S3=V-2:S4=V-1:SC=V+1:K=7746:Y=8120:S=0:L=3:P=32:H$="
"
20 POKEV-9,240:POKESC,170:PRINT"■■■■■■■■■■COSMIC  BUGS":PRINT"■■■■■■■(C)1984 S.
LYON"
30 PRINT"■■■■DEFINING  CHARACTERS":PRINT"■■■■■■■■PLEASE  WAIT"
40 POKEV,15:FORM1=1TO5:READM2,M3:POKES3,M2:FORM4=0TOM3*60:NEXTM4,M1:POKES3,0:GOT
O5000
50 DATA214,6,218,6,209,6,162,6,193,10
55 PRINT"■■■HIT ANY KEY TO START"
56 GETA$:IFA$=""THEN56
57 GOSUB600
60 POKEV-9,255:POKESC,10
70 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■■■i()*()=+■■(**(*)(=+■■)**(=+■i)";
80 FORM1=38466TO38488:POKEM1,3:NEXT:CS=30720:D=22:U=44:FORM1=38488TO38410:POKEM1
,7:NEXT
90 PRINT"----------■":POKE8185,45:POKE38905,5
100 PRINT"■■■SCORE■■■COSMIC■■LIVES":PRINT"■■"TAB(8)"■■■BUGS"
110 PRINTH$"m";S:PRINTH$TAB(17);L:PRINTH$"■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■m"
120 K=7746:POKEK+R,P:POKEK+R+1,P:POKEK+R+2,P
130 R=INT(RND(1)*19)+1:POKEK+R,33:POKEK+R+1,34:POKEK+R+2,35
140 K=K+D:G=INT(RND(1)*6)+1
150 FORT=1TO372STEPD:FORI=240TO230STEP-G*2
155 IFPEEK(K+R+T+22)=43THENGOSUB360
160 POKEK+R+T,36:POKEK+R+T+CS,1:POKEK+R+T,P:POKES2,I:GOSUB170:NEXTI,T:GOTO120
170 Z=PEEK(197)
180 IFRND(1)<.01THENSH=37:GOSUB320
182 IFRND(1)<.02THENSH=36:GOSUB320
184 IFRND(1)<.03THENSH=47:GOSUB320
190 POKEY+A,P:POKEY+A+1,P
200 IFZ=18THENA=A+.5
210 IFZ=17THENA=A-.5
220 IFZ=21THEN240
230 POKEY+A,38:POKEY+A+CS,6:POKEY+A+1,39:POKEY+A+1+CS,6:RETURN
240 POKES2,0:FORF=0TO350STEPD:POKES4,250:POKEY+A,38:POKEY+A+1,39
245 POKEY+A+1-D-F,46:POKEY+A+1-D-F,P
250 POKES4,0:PK=PEEK(Y+A+1-U-F)
252 IFPK=37THENS=S+30:GOSUB270
254 IFPK=36THENS=S+20:GOSUB270
256 IFPK=47THENS=S+10:GOSUB270
260 NEXT:GOTO170
270 POKEY+A+1-U-F,U:POKEY+A+1-U-F+CS,2:FORT1=230TO130STEP-1:POKES4,T1:NEXT
280 POKEY+A+1-U-F,P:POKES4,0:GOSUB300:GOTO170
300 PRINTH$"m";S:PRINTH$TAB(17);L:PRINTH$"■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■m"
305 IFCC=0ANDS>=1000THENGOSUB400:CC=1
310 RETURN
320 POKES2,0:FORT1=1TO5:R1=INT(RND(1)*220)+100
330 FORM1=250TO150STEP-1:POKES3,M1:NEXT
340 POKEK+R1,SH:POKEK+R1+CS,7
350 POKES3,0:RETURN
360 POKES2,0:FORM1=150TO250:POKES3,M1:NEXT:POKES3,0:FORM1=250TO130STEP-.1:POKES4
,M1:NEXT
370 POKEK+R+T+22,U:L=L-1:IFL=0THENGOTO500
```

```
380 GOSUB300
390 POKES4,0:RETURN
400 S=S+500:L=L+1:FORM1=1TO2:FORM2=9TO15:FORM3=200TO202:POKES1,M3
410 PRINT"■"TAB(250)"■BONUS"
420 PRINT"■"TAB(250)"      ":POKESC,M2:NEXTM3,M2,M1:POKES1,0:POKESC,10
430 PRINT"■■■
```

Delete

This Commodore 64 program comes from I A Clark of Croydon

This short routine can be added to any Commodore 64 program in order to delete a range of lines from within the program. Users with Simon's Basic or a similar package can add the routine using the MERGE utility.

Deleting or saving just parts of a program can usually be achieved by listing to the screen, NEWing, and re-entering using RETURN. But for larger sections, this routine can save time, though it isn't particularly fast.

```
60000 REM***ROUTINE TO DELETE LINES FROM SPECIFIED START NO TO FINISH NO
60010 INPUT"START NO";SX
60020 INPUT"FINISH NO";FX
60030 INPUT"INTERVAL";IX
60040 CT=SX
60050 PRINTCHR$(147);CT
60060 PRINT"FX=";FX;":IX=";IX;":CT=";CT+IX;":";:PRINT"GOTO60050"
60070 POKE631,19:POKE632,13:POKE633,13:POKE634,13:POKE198,4
60080 IFCT>FXTHEN60100
60090 END
60100 GETA$:IFA$<>""THEN60100
```

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User-friendly programming on the C16 and Plus/4

*An extract from **Brian Lloyd's** Commodore 16 — Plus/4 companion*

FOR A COMPUTER program to be really good it must be 'user friendly', which means that whoever uses the program is given full instructions on how to use the program properly, and that whatever that user does, however stupid, the program should carry on working and tell the user what he or she has done wrong. To help you to write such programs your computer has been supplied with error trapping facilities, so that if, for example, you press the RUN/STOP key when you do not want to, then the program will be able to explain what you have done wrong. Figure one is a short program which illustrates this.

```
10 TRAP 90
20 SCNCLR
30 PRINT"PLEASE DO NOT PRESS THE RUN/STOP KEY"
40 PRINT"WHILE I FILL THE SCREEN WITH O's"
50 FOR N=1 TO 500:NEXT N
60 FOR N=1 TO 1024:PRINT"O";:NEXT N
70 FOR N=1 TO 500:NEXT N
80 RUN
90 SCNCLR
100 IF ER=30 THEN PRINT"I ASKED YOU NOT TO PRESS THAT
KEY!":ELSE STOP
110 PRINT"NOW, I WILL START AGAIN"
120 PRINT"BUT PLEASE DO NOT PRESS THE RUN/STOP KEY"
130 FOR N=1 TO 2000:NEXT N
140 RESUME 20
```

Line 10 of this program contains the first of the error trapping commands — TRAP. This command tells the computer which line to jump to when it comes across an error. In this case the TRAP command tells the computer that if there is an error it should go to line 90 and carry on with the program from there.

The rest of the program is straightforward, until you come to line 100. In this line we refer to a variable, ER, which has not been assigned any value by the computer. This variable is a system variable, which is a variable used by the computer. ER contains the number of the last error which was made. Since the error number for pressing the RUN/STOP key (pressing the RUN/STOP key is classed as an error by the computer) is 30, the computer will carry out all the instructions from lines 100 onwards only if the RUN/STOP key had been pressed.

Line 140 has another new command on it. The RESUME command allows the computer to continue with the main program after an error has occurred. RESUME is similar to GOTO except that it also marks the end of the error-trapping routine, so when the computer comes across line 140 it realises that this is the end of the error-trapping subroutine, and then jumps to line 20 to continue with the program from there.

There is another version of the RESUME statement — RESUME NEXT. This statement tells the computer to go to the main program and carry on with it from the NEXT statement after the one which caused the error. For instance, change line 140 to

140 RESUME NEXT

then type RUN. At some point press the RUN/STOP key. You will receive the same message telling you that you shouldn't have pressed that key, and then, after a short pause, the computer will continue with the program from where it was stopped.

There is another system variable which is used for errors. This variable is EL and contains the line number in which the last error occurred. So if you change line 10 to

10 HELLO

and RUN the program you will immediately get an error (obviously). If you now type

PRINT EL

the computer will display the number 10, which is the line in which the error occurred.

We know that the system variable ER contains the error number of the last error that occurred, but a number doesn't tell you much about what has happened. For instance, if you were told that error number 11 has just occurred you wouldn't be much the wiser. Fortunately, there is a function which helps us in this matter — ERR$. If you type

PRINT ERR$(11)

the computer will display the message SYNTAX on the screen. This is because error number 11 is a SYNTAX ERROR. Similarly, if you type

PRINT ERR$(14)

you will see the message ILLEGAL QUANTITY displayed on the screen. You can use the ERR$ to find the message for any error number except those which refer to the disk drives.

The HELP command is extremely useful for when you are trying to find a mistake in a program line. If, for instance, you have a line with four or five commands in it, and you know that there is a mistake on that line but do not know where, you simply have to type HELP and the line with the mistake in it will appear on the screen. The actual command with the mistake will flash so that you can identify it easily. The HELP command will only work after you have received an error message (pressing the key marked HELP has the same effect as typing HELP).

It is very rare when a program of any length or complexity works first time. Finding real errors (the ones which the computer spots as errors and tells you about) are no problem, especially with the HELP command. However, there are often bugs in the program which, although the program works, prevent the program from doing exactly what it is supposed to do.

In order to make the extermination of bugs much easier your computer has been given two commands — TRON and TROFF. The TRON command tells the computer to turn the TRaceON. When this happens the computer will display the line number of the line which is currently being carried out on the screen, so as soon as you see the mistake you can look to see which line is being carried out, and that will be the line with the mistake in it.

For instance, if we wanted the message on line 20 of program two to read SAUSAGE AND MASH instead of BEANS ON TOAST we could use the TRON command to find the line which displays the message BEANS ON TOAST (I know you can see it, but in a program with about 200 lines it would be a bit more difficult to spot, and this is an example). So, type in the program, type TRON and then RUN the program.

```
10 SCNCLR
20 PRINT"BEANS ON TOAST"
30 FOR N=1 TO 10
40 PRINT"THIS IS A TEST";
50 NEXT N
```

As each line is carried out you will see the line number appear enclosed in square brackets ([ ]). You will see [20] appear as the message BEANS ON TOAST appears on the screen, so you will immediately ▶

◀ know that line 20 displays that message. The trace will remain on until you turn it off with the TROFF (TRace OFF) command.

It is very often useful to be able to have a list of numbers or characters which the computer can refer to and use. These numbers or characters could be a list of names and addresses which you want the computer to search through for a specific name, for example. One way of doing this is to store each person's name and address in a string variable, or possibly a string array, and search through each variable when you want to search for a person's name. An easier way, though, would be to have a list of DATA which the computer could look through for the correct name. To set up such a list we use the DATA statement, like this.

1000 DATA "FRED BLOGGS", 123456, 'JOHN BROWN", 123642

Statements

This is just a short list, only two names and telephone numbers, but the list could go on, using several DATA statements. As you can see from the above DATA statement, any characters can be included in the list, and can be enclosed in quotation marks, although this is not essential. Numbers can also be stored in the list, and both numbers and characters can be mixed freely, as you can see.

It is not much use having a list if you cannot do anything with it. What we have to do is READ each piece of data into a variable, the numbers being read into a numeric variable, and the other characters being read into a string variable (numbers can also be read into a string variable if you want, but you cannot perform calculations with them if you do this). Program three is a simple telephone directory which asks you for the person's name and then tells you their telephone number.

```
10 SCNCLR:INPUT"WHAT IS THE PERSON'S NAME";NAME$
20 FOR N = 1 TO 5:READ A$,X
30 IF A$ = NAME$ THEN PRINT"THAT PERSON'S TELEPHONE
NUMBER IS";X:GOTO 60
40 NEXT N
50 PRINT"SORRY, I DON'T KNOW THAT PERSON'S TELEPHONE
NUMBER"
60 PRINT:PRINT"PRESS ANY KEY"
70 GETKEY A$:RUN
80 DATA FRED BLOGGS, 123456,JOHN BROWN,123642,BILL
SMITH,129832
90 DATA JACK JONES,126452,PETER JOHNSON,327428
```

When you RUN this program the screen will clear and you will be asked for the name of the person whose telephone number you want (choose one from the names in the DATA statements). The computer will then search through the list of DATA and if it finds that person's name it will tell you his telephone number (this is immediately after the name in the list). If the computer does not find the person's name then it will tell you.

The program works like this

Line 10: Clear the screen. Display the message 'WHAT IS THE PERSON'S NAME' and then wait for a response before assigning that response to the string variable NAME$

Line 20: Start repeating everything between the FOR and NEXT command 5 times, with the value of the variable N starting at 1 and increasing by 1 each time round the loop until it reaches 5. READ the next piece of DATA from the list and assign it to the string variable A$, then READ the next piece of DATA and assign it to the variable X

Line 30: Test to see if the string variable A$ is the same as the string variable NAME$. If it is then display the message 'THAT PERSON'S TELEPHONE NUMBER IS' and then display the value of the variable X before jumping to line 60 and carrying on with the program from there

Line 40: Marks the end of the FOR . . . NEXT loop

Line 50: Display the message 'SORRY, I DON'T KNOW THAT PERSON'S TELEPHONE NUMBER'

Line 60: Display a blank line then display the message 'PRESS ANY KEY'

Line 70: Wait for a key to be pressed and assign the symbol on that key to the string variable A$ before re-starting the program

Line 80: List of DATA

Line 90: List of DATA

Line 20 of the program READs in the next piece of DATA from the list at the end of the program (in fact it READs two pieces of DATA, but only one at a time). Each time a piece of DATA is read in the computer remembers where the next piece of DATA is, so that the next time it comes across a READ statement it knows where to take the DATA from.

Several pieces of DATA can be read in with one READ statement, as you can see from the above program. All that you have to do is tell the computer which variables you want the DATA to be assigned to in the correct order, and separate each variable with a comma. You can READ in as many pieces of DATA as you like, as long as the variable list will fit onto a normal program line, if it doesn't you will need to use two lines and two READ statements.

But what happens when the computer reaches the end of the DATA list? Well, once the computer reaches the end of the list it has no more DATA to READ in, so it gives you an OUT OF DATA ERROR if you keep on trying to READ in more DATA. For instance, if you change line 70 of the above program to

70 GETKEY A$:GOTO 10

and RUN the program for a while you will eventually receive an OUT OF DATA ERROR. This is because the RUN command (which was originally used in line 70) also resets the DATA pointer (the one which the computer uses to remember where it is in a list of DATA) back to the start of the list, whereas a GOTO command does not. To overcome this problem, we use the RESTORE command, which tells the computer to start READing in DATA from the beginning of the list again. If you now change line 70 to

70 GETKEY A$: RESTORE: GOTO 10

then the program will work perfectly.

You may also tell the computer to start taking DATA from a certain line number. For instance, alter line 70 to

70 GETKEY A$: RESTORE 90: GOTO 10

The RESTORE 90 statement tells the computer to set the data pointer to the start of the DATA in line 90. You will find that

you will only be able to find the addresses of Jack Jones and Peter Johnson.

You may have thought up to now that when the computer reaches a READ statement it jumps to the line which has the DATA on it and looks through that line for the next piece of DATA. This is not the case, however, and to prove this type TRON and RUN the program. You will see that at no time does computer jump to lines 80 or 90 to look through the DATA list. This is because the computer knows exactly where the next piece of DATA is stored in its memory, so it does not need to bother about line numbers, it goes straight there.

String variables are extremely useful, and there are many ways in which you can chop them up and re-arrange them to suit your needs.

If you are familiar with the commands IF . . . THEN, you will understand lines like

```
130 IF A$ = "YES" OR A$ = "Y" THEN . . .
```

It would be much easier if we could test to see if the first letter of A$ is a Y because then we could accept answers such as Y, YES, YEAH, or virtually any other version of the word YES starting with a Y. To do this we use the LEFT$ command, like this

```
130 IF LEFT$ (A$,1) = "Y" THEN . . .
```

This particular line tests to see what the first character of the variable A$ is. If you change line 130 to

```
130 IF LEFT$ (A$,2) = "YE" THEN . . .
```

then the computer will test to see what the first two characters of the variable A$ are (the 2 in the LEFT$ command tells the computer you want the first 2 characters, changing it to 3 would mean the first 3 characters).

Variable

Of course, you don't have to use a string variable with the LEFT$ command (or any of the other string handling commands, come to that), you could also use characters enclosed in quotation marks, like this

```
250 IF LEFT$ ("COMPUTER", 4) = "COMP" THEN . . .
```

Here is a short example program:

```
10 SCNCLR: INPUT "DO YOU LIKE USING COMPUTERS"; CO$
20 IF LEFT$ (CO$,1) = "Y" THEN PRINT "I'M GLAD ABOUT THAT!"
30 IF LEFT$ (CO$,1) = "N" THEN PRINT "OH, I'M NOT TO BLAME!"
```

The RIGHT$ command is very similar to LEFT$, except that LEFT$ tests to see what the first characters of a string are, but the RIGHT$ command looks to see what the last characters of a string are. Try this example

```
10 SCNCLR: INPUT "TYPE IN SOMETHING PLEASE"; ZZ$
20 PRINT "THE FIRST 2 CHARACTERS THAT YOU TYPED IN WERE";
30 PRINT LEFT$ (ZZ$,2): PRINT "THE LAST 2 CHARACTERS THAT YOU TYPED IN WERE";
40 PRINT RIGHT$ (ZZ$,2)
```

The 2 in the RIGHT$ command tells the computer that you want the last two characters of the string, and can easily be changed, just like the LEFT$ command.

The MID$ command is used to find out

what the middle characters are, rather than the beginning or end ones. Rather than just saying how many characters you want to test, as you do with the LEFT$ and RIGHT$ commands, you also have to say where you want to start from. For example, if you had a line such as this

```
310 A$ = MID$ (B$,4,3)
```

then the computer will assign three characters from the middle of the string variable B$ to the string variable A$, with the first of these characters being the fourth character of the string variable B$.

It is also possible to replace parts of a string variable by using the MID$ command. Here is a short example program which does this;

```
10 SCNCLR
20 A$ = "HELLO HELLO EVERYBODY!"
30 PRINT A$
40 MID$ (A$,7,5) = "THERE"
50 PRINT A$
```

If you look at line 40 you will see the MID$ command being used to replace the second HELLO with THERE. This is done simply by telling the computer where in the string variable you want to start (the seventh character in this case) and how many characters you want to replace (in this example we want to replace five characters) and then tell the computer which characters you want to replace the old ones with. As you can see the replacement characters must be enclosed in quotation marks.

The INSTRing command is used to find out if one string is contained IN another STRing. Try this short program

```
10 SCNCLR: A$ = "PETER PIPER PICKED A PECK OF PICKLED PEPPERS"
20 PRINT INSTR (A$, "PICK")
```

When you RUN this program the number 13 will appear on the screen, because the P of the letters PICK is the 13th letter of the string variable A$. What you have just told the computer to do is to search through the string variable A$ to see if the letters PICK are contained within it. If these letters are contained in A$ then the computer will tell you exactly where the first letter of PICK appears in the string A$.

If you look at the string A$ you will see that the letters PICK appear twice, once in the word PICKED and once in the word PICKLED. The computer will only find the first occurrence of the characters which you are searching for. In order to make it find the second occurrence of the letters PICK you will have to change line 20 to

```
20 PRINT INSTR (A$, "PICK", 15)
```

When you RUN the program this time the number 30 will appear on the screen. This time the computer has started searching for the letters PICK at the 15th character of the string A$. In other words, the computer will search through the letters CKED A PECK OF PICKLED PEPPERS for the first occurrence of the letters PICK, and find that the P of PICK is the 30th character of the string variable A$.

If the computer cannot find the characters that you are searching for in the string then it will return the number 0.

Brackets

The LEN command is used to find out the LENgth of a string variable, or how many characters it contains. This short program illustrates the use of the command:

```
10 SCNCLR: A$ = "SUPERCALIFRAGILISTIC EXPIALIDOTIOUS!"
20 PRINT "THE STRING VARIABLE 'A$' CONTAINS";
30 PRINT LEN (A$); "CHARACTERS!"
```

As you can see, the string variable that you want to refer to must be enclosed in brackets after the LEN command. ■

Brian Lloyd's article will be continued next month. The Commodore 16 — Plus/4 companion is published by Sunshine Books at £5.95, and is available from bookshops or by mail order

Clear graphics

Book: *Commodore 64 Games Book 2*
Author: *Gregg Barnett*
Publisher: *Melbourne House*
Price: *TBA*
Reviewer: *Phil Bonner*

The main problems with books of program listings are usually clarity, especially when graphics symbols are included, and the difficulty of knowing how many spaces to include within PRINT statements. Gregg Barnett's book scores ten out of ten on both counts. Special versions of the graphic characters have been used throughout, and they really are crystal clear. Instead of spaces, strange hump-like symbols have been printed, which are very simple to count, and a checksum routine is included to avoid the dreaded 'Syntax Error' message.

The programs themselves are similar to those found in many other books of its type. Most of them are simple arcade-style games which, though inferior to commercial machine-code products, are fun to play and make good use of graphics and sound. Screen photographs are included, some of them being in colour, but the descriptions of the games are rather too brief.

There is also a very useful machine-code routine, presented as a Basic loader, for moving sprites around the screen, with examples of its use. This routine works very well and could easily be incorporated in one's own games programs.

All in all, this is an excellent publication of its type, which I can recommend highly.

Games galore

Book: *Giant Book of Games for Your Commodore 64*
Author: *Tim Hartnell*
Publisher: *Fontana*
Price: *£3.95*
Reviewer: *Chris Whitcombe*

I'm not a lover of books of games; mostly because they are usually only a collection of programs that didn't 'make the grade', but with Tim Hartnell at the helm the *Giant Book of Games for Your Commodore 64* could well be an exception. It is. There are 46 offerings including arcade, card, memory and maze games.

Some of the selections really are very good. *Worms Alive, Transam* (a motor racing game), *Ropes and Manholes* and *Monkey Kong* are four of the titles included. Some use wrap-around screens, some have various levels of difficulty and a couple make good use of the SID chip. There is a Typing Tutor program for those who wish to practise their keyboard skills. Each has an introduction saying what is required of you along with an explanation of how the program works. Some of these are fairly detailed and quite useful to anyone wishing to understand the ins and outs of how to achieve a good program. All the listings have been printed using the Vic 1520 plotter/ printer making them easy to read.

At £3.95, that's about nine pence per program. They are considerably better than that price tag suggests. If you are looking for a book of games, this one is well worth considering.

Friendly start

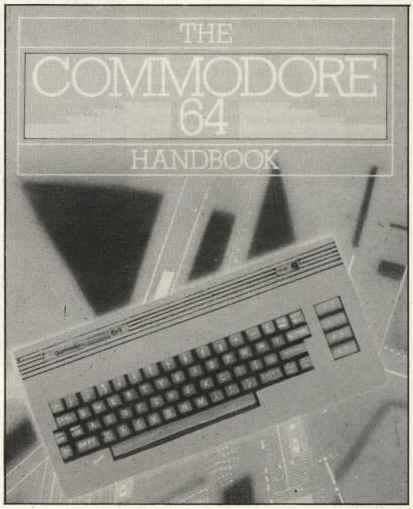
Book: *Vic-20 Machine Code*
Author: *Bruce Smith*
Publisher: *Shiva Publishing Ltd*
Price: *£5.95*
Reviewer: *David Shepherdson*

This book is part of Shiva's Friendly Micro Series, and is on a subject close to my heart. To me it is not going to be a rival to Honeyfold's *Doctor Watson,* rather the two could be read in conjunction. It is an easy book to read, as the author has a sense of humour which shows through from time to time. Regrettably, the programs appear to have been typeset rather than dumped off a printer. Whilst this makes for easier reading, it may allow many mistakes and omissions to creep in. In general, however, there are line by line explanations which should help to point to missing lines or statements in some lines.

In the program examples, the data for the Machine Code is split into three columns, the first column gave the decimal values, the second the Hex and the third used Mnemonics and Assembler. One thing I found confusing here was that in places, the Hex and Decimal values had been mixed up in the Assembly column, rather than sticking to either Hex *or* Decimal.

One good point is that confusion between 'O' and '0' (!?) is avoided as a zero is shown by using the computer's version (ie: slashed).

In general, this book is an excellent guide to Machine Coding, just a few problems to be wary of, but a great book with which to start learning Machine Code.



Valuable guide

Book: *The Commodore 64 Handbook*
Authors: *Peter Lupton and Frazer Robinson*
Publisher: *Century Communications*
Price: *£5.95*
Reviewer: *Phil Bonner*

Since the first 64's were produced, with their woefully inadequate User's Guides, there has been a continuing flood of books which have tried to put things right. This publication appears at first to be just one more, but when you examine it closely it proves to be far superior to the majority of such books.

This is the companion volume to *The Advanced Commodore 64 Handbook* by the same authors, and the same high standard is maintained throughout. By itself it is ideal for the beginner and provides enough material to keep him happily occupied for a long while.

In the first chapters simple information is given on setting up the machine and getting started. Then the authors launch into a thorough, step by step examination of Basic programming. Chapters are also included which explore the 64's special characteristics of sound, sprites and bit-mapped graphics. To illustrate the subject matter program listings are included, some of which are highly sophisticated utilities, such as a sprite editor, a user-defined graphics generator and a datafile program. All of these are available on cassette from the publisher if required.

The usual appendices complete the book, which at £5.95 must be excellent value for money.

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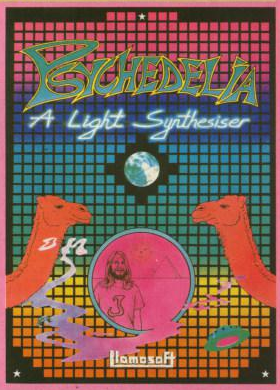

Jeff Minter's latest Llamasoft production isn't a game, and it isn't a utility. You don't score points, you don't zap aliens, and there are no goats. But we're still giving away 15 copies

WHATEVER Commodore machine you own, you can win a copy of Jeff Minter's latest and whackiest program. Not an arcade game, not an adventure game, Psychedelia is a "light synthesiser". Controlled by a joystick, and preferably in time to your favourite music, you can use the program to create fantastic light shows on your computer screen. You control the position of the central cursor, and as you move it around the screen multi-coloured light displays explode into action.

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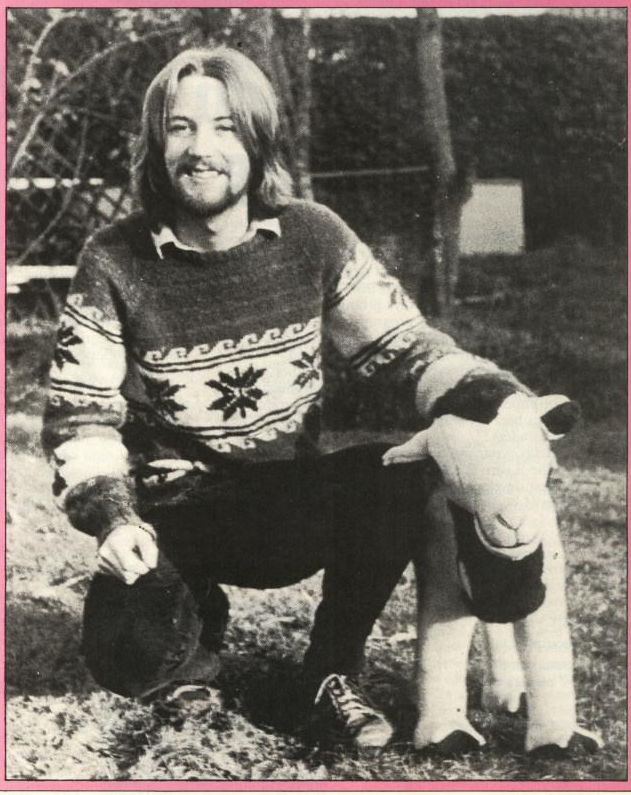
Psychedelia costs £7.50 for the Commodore 64, and £6 for the Vic 20 and C16. We've persuaded Llamasoft to offer five copies of the program for each machine.

All you have to do to win is to suggest a name for the toy llama seen in the photo of Jeff. Put your answer on a POSTCARD, with your name, address, and the Commodore machine you own, and complete this tie-breaker in an apt, amusing and original way in fifteen words or fewer; "Llamasoft games blow my mind because . . ." Send your entry to Llamasoft competition, Commodore Horizons, 12/13 Little Newport Street, London WC2H 7PP, to arrive by the last working day in February. Winners will be announced in the April issue. Normal competition rules apply. ■



The winners of December's Eureka! Currah Speech Synthesiser contest are; James Kennedy of Ealing; T B Thoulass of Luton; Stephen Hunt of Burgess Hill; Clive Wild of Isle of Man; Andrew Philpott of Hertford; D F Price of Ebbw Vale; D R Nott of Bristol; C C Harris of Worksop; B T Edwards of Sidcup; and Peter Drobinski of London. The highest entry, from Lt Col James Kennedy, was 1126 words, culled from the Oxford English Dictionary and all its supplements over a three-day period. The runners-up averaged a paltry 300 words. Each will receive a Currah Speech 64 voice synthesiser, courtesy of Domark, the creators of the Eureka! adventure game. ■

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CBM 64 software to swap. I have got titles such as Bungling Bay, Archon 2, Hesgames Doodle, Bruce Lee (disk) Ghost Busters, Pitstop, 1-on-1, Frogger 2, Gyruss, Archon, QBert, Pogojoe (tape). Tel: (0703) 558375 ask for Dean after 6pm.

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ANSWER BACK

Random access

I AM WRITING a program in machine code which requires a random number between 0 and 255. I would prefer to use the 64's random number generator, but I don't know where to find or how to use any routines already in the 64's memory.
Thomas Horth
High Wycombe
Bucks

JSR$EOD3 is equivalent to RND(−X) and seeds the random number with a value dependent on FAC1. A constant value can be seeded using this routine, but with machine code it's quicker to store your own seed value directly into $8B to $8F. JSR $EOBE uses a formula to calculate a new random number leaving the result in FAC1 and $8B to $8F. This sequence is completely predictable. JSR $EO9E uses VIA timers to generate a true random number, except that, where loops are very short, they may begin to show regularities. Try this routine:

```
JSR $EOBE (new random number from old)
LDA $8C
FOR $8D (combine data bytes)
FOR $8E (. . . into composite bytes)
FOR $8F
```

using four bytes excluding the exponent.

For more detailed information try Raeto West's forthcoming book Programming the 64, which is due for publication in March.

Collision routine

I HAVE recently started writing a game on the 64 involving the use of sprites. Could you explain the use of the offset and collision flag? I've read several books but none of them seem to be clear enough on the subject.
Simon Mills
Aston
Sheffield

TO DETECT collisions between sprites in Basic use the following:

```
100 V = 53248
110 IF PEEK(V + 30)AND
    X = X THEN . . .
```

and so on into the action of your program. This will check to see if sprite number X has collided with another sprite or sprites.

```
120 IF PEEK(V + 31)AND
    X = X THEN . . .
```

will check if sprite X has collided with a background character. All of the sprites can be checked in this way, and the sprite number stored accordingly to be used in your game. There is no offset flag in CBM Basic. It may be that the books you have referred to are misnaming the different sprite register positions.

Picture music

I HAVE a 64 and am interested in techniques of displaying a picture while loading. If this is done by a machine code routine in commercial programs, is there any way to achieve the same effect in Basic?

I would also like to know how to play music while loading.
Dave Barker
Tamworth
Bucks

FIRST CREATE your picture, then use as the last line of the program

```
1000 LOAD"CONT",8
```

where "CONT" is the name of the main program. In Basic, the first program should be larger than the called program, though this is not necessary if calling machine code. The picture will remain on the screen until removed by a new program.

Music while loading is possible in several ways. You could use the music as a wedge in a machine code interrupt routine, in which case the music would continue playing while the new program starts executing.

A Basic program can create music and call a machine code program, while the music is playing, providing the new program does not load into the same area of memory as the Basic program and its variables, arrays and so on. When loading is complete the Basic program will rerun, and then can be diverted to a SYS call to the new program using the familiar procedure of

```
10 A = A + 1:IF A = 2 THEN
   SYS49152
20 REM rest of program
```

Portable problem

I AM ONE of those people who could really make use of the Commodore SX64 portable computer, since I am much on the move. I already own a standard CBM64 and a good deal of tape software, but how can I connect the SX-64 to a C2N or a conventional tape recorder?
H Ingolffson
Varma
Iceland

THERE'S no real solution to this problem, since the SX-64 doesn't have a cassette port, and I haven't heard of any company offering to add one on. All you can do is convert your cassette programs to disk, either by using a tape-to-disk transfer utility or by exchanging them through your software supplier, if disk versions are available. You will have to be prepared to pay extra, of course.

Screen clear

I HAVE RECENTLY started programming on a CBM64 and cannot understand how to clear part of the screen. The program is a children's game which builds up a shape each time a question is answered correctly, but I cannot clear the previous sum displayed and its answer, as it prints immediately below the previous question and answer. If I try PRINT CHR$ (147) this clears the screen completely. Can you suggest how to solve this problem?
C R Roberts
Cinderford
Glos

IN BASIC, using the HOME key as a reference point, you should use sufficient numbers of CURSOR RIGHT and CURSOR DOWN symbols in your input string (or prompt string) to overwrite the previous question and answer.

Giving a prompt

CAN YOU GIVE me some advice on a program I am writing to produce percentage ratios? I have produced the screen format and a subroutine for performing the calculations. However, I do not see how I can bring the cursor to a particular section as a prompt for the operator to enter the figures.
R Morrison
Kidlington
Oxford

AS IN A previous answer, you should use cursor control codes to place the cursor in the right position. The home key acts to give a reference point, and the cursors set the coordinates in placing the screen cursor. The alternative would be to POKE the values into screen memory by using GET to obtain the answers and converting to the POKE value.

Underline method

I SOMETIMES find listings I want to copy which feature underlined text, but when I run the programs the underlining in the listing always disappears. Could you let me know how to use underlining in programs?
Kevin Henstock
London

THERE ARE two ways of looking at the question. Firstly, the words in the listings might have been underlined independently of the program in order to give them emphasis.

Secondly, you can use two program lines which have the same effect to achieve underlining, for instance

```
10 PRINT "HELLO"
20 PRINT "TTTTT"
```

where "T" represents the Commodore logo key with T, giving an underline character.

If you need help with a technical query or problem write to Jack Cohen, Commodore Horizons, 12-13 Little Newport Street, London WC2H 7PP

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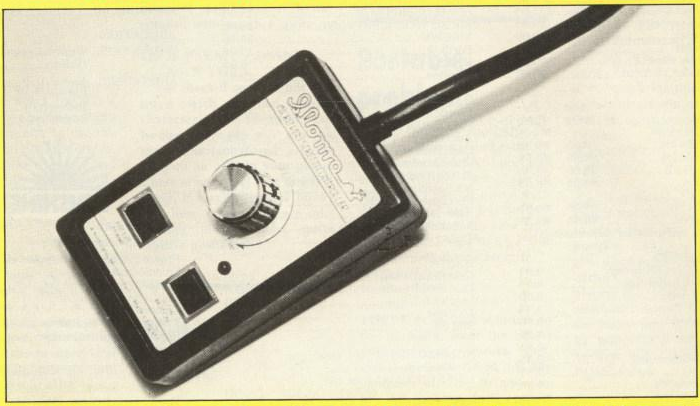
Dash for a Slomo



If you can't keep up with your Commodore 64, this handy gadget can slow it down to your pace — and there are five to win in our simple contest

THIS MONTH five lucky entrants will win Commodore 64 Slomos from Cambridge Computing.

The Slomo is a hand-held screen display controller which plugs into the 64's cartridge port. In operation, it introduces an unmaskable interrupt into the micro's operating system, at a rate which can be varied by the speed control knob. In other words, Slomo lets you control the speed of programs as they run — slow them down, speed them up, or freeze them completely! And you can leave Slomo plugged in all the time.

It's a great aid in those difficult arcade games where the action is just too fast for you; or if you want to take screen photographs of your own programs, you can freeze the action at any time.

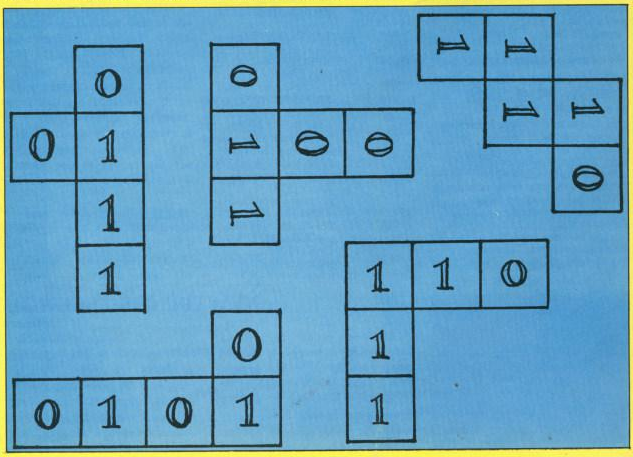
The Slomo sells for £14.95, but all you have to do to win one is solve the Hell Nook puzzle.

Marion has brought a set of pentaminoes into the Micro Club for the others to play with. When they're correctly assembled, they form a square from which can be read ten binary numbers, five horizontally and five vertically. All the binary numbers have three digits set to 1, and two to 0, but no number is the same as any other.

What you have to do is draw a diagram showing the assembled square, and complete the tie breaker sentence in an apt, original and amusing way in fifteen words or fewer; "Slomo sets the pace because . . ."

When you have done that, send your entry on a POSTCARD, with your name and address, to Slomo Competition, Commodore Horizons, 12/13 Little Newport Street, London WC2H 7PP, to arrive by the last working day of February. Results will be announced in the April issue. Usual competition rules apply.

The winners of the December Commodore competition are Jon Ryder-Oliver of Dunstable, who will receive a Plus/4, and J D Pearce of Immingham, who gets a C16, from Commodore UK. ■



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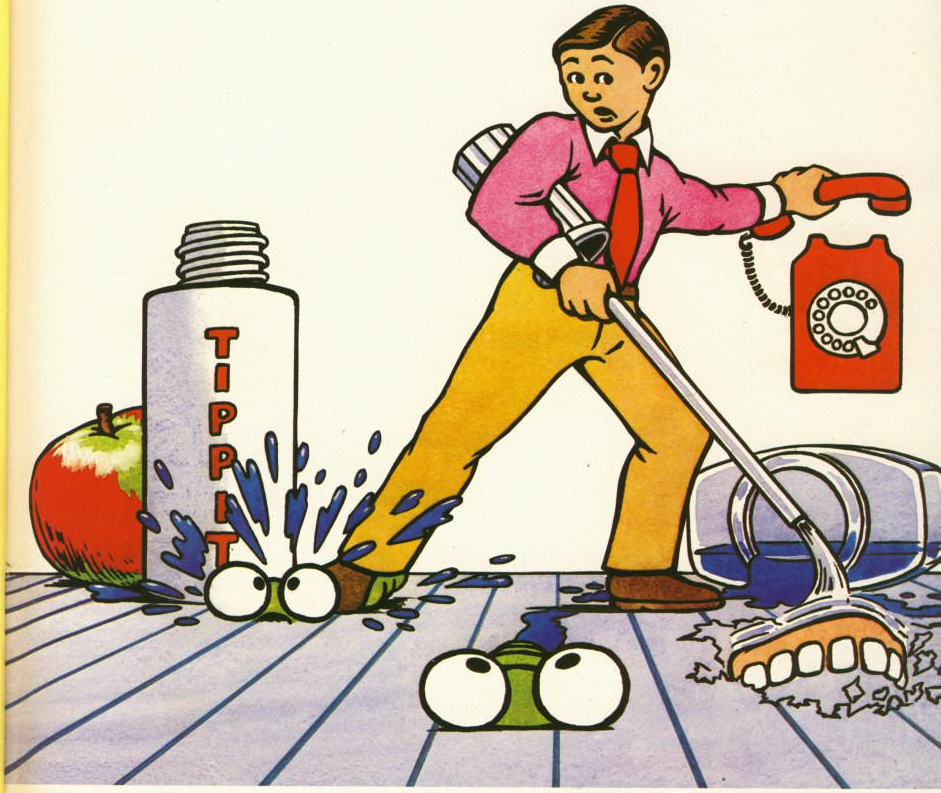

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commodore 64

Alice IN VIDEOLAND

PURE MAGIC!

Join Alice in her journey through Videoland - an enchanted place populated by strange creatures such as bread-and-butterflies and pipe smoking caterpillars; where little girls change size and flamingos turn into croquet mallets!

Alice in Videoland is a revolutionary new concept in entertainment for the Commodore 64, incorporating some of the finest graphics ever seen on any home computer, accompanied by a charming musical score. There are four different game scenes involved, and your performance in earlier ones will affect your ability to get through later ones and determine your eventual total score.

Scene One - Stunning title page graphics give way to the first game scene as Alice falls into the rabbit's warren. Score points for collecting the objects to be found there - including keys to open doors, bottles to make her smaller, cakes to make her bigger!

Scene Two - Out in the garden the Cheshire cat looks on as Alice meets the pipe-smoking caterpillar. Help her to catch the bread-and-butterflies and the rocking-horse flies that change into the balls used in the croquet game in the last scene!

Scene Three - Alice is a pawn in the chess game where her opponents are the Jabberwocky and Tweedledum and Tweedledee. Help her across the board by protecting her with your White Knights!

Scene Four -The most bizarre croquet game ever! Help Alice hit the balls through the playing-card-soldier hoops before the Queen of Hearts stomps on them!

Alice in Videoland is available for the Commodore 64 on disk - £12.95, and now on cassette - £8.95.

Alice in Videoland features graphics created with the Koala Pad.

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